UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

APR 15 1993

MEMORANDUM FOR: Distribution*

FROM: Joe P. Clem
Joe P. Clem
Chief, Plans and Regulations Division

SUBJECT: Amendment 28 to the Fishery Management Plan (FMP) for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area (BSAI)

Enclosed is a copy of the subject amendment and the associated documents prepared by the North Pacific Fishery Management Council for formal review under the Magnuson Fishery Conservation and Management Act.

The amendment would implement Amendment 28 of the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area (BSAI). This rule would establish three groundfish management districts within the Aleutian Islands Subarea of the BSAI, and would revise the final 1993 specifications for Atka mackerel. Also attached for your review is the environmental assessment/regulatory impact review for the subject action.

Please provide your comments (including "no comments") by May 27, 1993. If you have any questions, call Cathey Belli at (301) 713-2343.

Attachments

*Distribution

F/CM
F/CM1 - Fricke
F/CM2 - Clem, Hooker
F/CM3 - Magill
F/EN - Pallozzi
GCF - Rogerson
GCEL - Kuruc
Fx3 - Sissenwine
F/PR2 - Montanio
F/HP1 - Hall
CS/EC - Cottingham
N/ORM4 - Burgess
GC - Johnson
OGC - Malone
OMB - Minsk

CHANGES TO THE FMP FOR THE GROUNDFISH FISHERY OF THE BERING SEA AND ALEUTIAN ISLANDS AREA

On page 14-1, under paragraph A of Section 14.2, a new paragraph is added, to read as follows:

> For the purpose of spatially allocating TACs, Area IV, the Aleutian Islands Management Area, is divided into three districts, defined as follows:
>
> Eastern District -- That part of the Aleutian Islands Management Area between 170° W longitude and 177° W longitude.
>
> Central District -- That part of the Aleutian Islands Management Area between 177° W longitude and 177° E longitude.
>
> Western District --That part of the Aleutian Islands Management Area west of 177° E longitude.

On page 19-12, under paragraph 2, a new paragraph is added after the section referring to Area IV, to read as follows:

> For the purpose of spatially allocating TACs, Area IV, the Aleutian Islands Management Area, is divided into three districts, defined as follows:
>
> Eastern District -- That part of the Aleutian Islands Management Area between 170° W longitude and 177° W longitude.
>
> Central District -- That part of the Aleutian Islands Management Area between 177° W longitude and 177° E longitude.
>
> Western District --That part of the Aleutian Islands Management Area west of 177° E longitude.

DRAFT FOR SECRETARIAL REVIEW

ENVIRONMENTAL ASSESSMENT/REGULATORY IMPACT REVIEW

FOR THE

PROPOSAL TO CREATE DISTRICTS
WITHIN THE ALEUTIAN ISLANDS MANAGEMENT SUBAREA

AMENDMENT 28

TO THE FISHERY MANAGEMENT PLAN FOR
GROUNDFISH OF THE BERING SEA AND ALEUTIAN ISLANDS

Prepared for the
North Pacific Fishery Management Council

Prepared by
National Marine Fisheries Service
Alaska Fisheries Science Center
Alaska Regional Office

April 12, 1993

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1.0 INTRODUCTION

1.1 Management Background

The eastern Bering Sea (BS) groundfish fisheries in the U.S. exclusive economic zone (EEZ) are managed under the Fishery Management Plan for the Groundfish Fishery in the Bering Sea and Aleutian Islands Area (BSAI). The Fishery Management Plan (FMP) was prepared by the North Pacific Fishery Management Council (NPFMC, Council) under the Magnuson Fishery Conservation and Management Act (Magnuson Act). The FMP was approved by the Secretary of Commerce (Secretary) and became effective in 1982.

Most Bering Sea groundfish total allowable catches (TAC) are set for the BSAI. The exceptions are pollock, sablefish, and rockfish, for which separate TACs are set for the eastern BS and Aleutian Islands (AI) subareas. Presently, the FMP does not provide for apportioning AI TACs in any geographical units smaller than the entire subarea. At its September meeting, the Council recommended the initiation of a plan amendment to split the AI. This request stemmed from Scientific and Statistical Committee (SSC) discussions that in recent years the commercial catches of groundfish in the AI had become spatially concentrated in a relatively small portion of the subarea. At its September meeting, the SSC recommended an overall preliminary ABC of 117,100 metric tons (mt) for Atka mackerel if the TAC could be apportioned among districts within the AI, noting the need to distribute this increased harvest level in proportion to the distribution of biomass. Due to the lack of the current legal regulatory ability to permit the apportionment of TACs within the AI, the SSC set the Atka mackerel preliminary ABC at 32,100 mt, the amount it felt could be safely taken in the portion of the AI normally fished. These ABCs were adopted as final ABCs at the December SSC meeting. In response, the Council, at its December meeting set ABC for Atka mackerel at 117,100 mt and the TAC at 32,000 mt. Additional quota of Atka mackerel could become available from the reserves, to be fished in the western portion of the AI, if the subarea is subdivided in 1993. Thus, the need for a plan amendment to split the AI, thereby providing a mechanism to apportion AI TACs, became particularly critical for the Atka mackerel fishery.

This environmental assessment/regulatory impact review (EA/RIR) is an analysis of the efficacy and the potential biological and socioeconomic impacts of establishing districts within the AI. The creation of districts within the subarea could potentially provide for the apportionment of TACs for any groundfish species. However, only Atka mackerel was included in the analysis because (1) Atka mackerel is the only species for which sufficient biological information currently exits on which to establish separate ABCs within the AI, and (2) industry demand for an increase in availability of Atka mackerel in 1993 is high.

The Council reviewed this EA/RIR and recommended a preferred alternative at its January meeting. The Council recommended a plan amendment that will subdivide the AI into three smaller management areas. If this action is approved by the Secretary, the implementing regulations could be in place by August 1993. Under this amendment, the Council will have the opportunity, during its specification process at the September and December meetings, to assign TACs to more finite areas within the AI portion of the BSAI. For 1993, the Council is expected to consider an increase in the TAC of Atka mackerel at its June 1993 meeting.

1.2 Purpose of the Document

This document provides background information and assessments necessary for the Secretary to determine if the alternatives being considered by the Council are consistent with the Magnuson Act

and other applicable law. It also provides the public with information to assess the alternatives that the Council is considering and to comment on the alternatives. These comments will enable the Council and Secretary to make a more informed decision concerning the resolution of the management problems being addressed.

1.2.1 Environmental Assessment

One part of the package is the EA that is required in compliance with the National Environmental Policy Act of 1969 (NEPA). The purpose of an EA is to determine whether significant impacts on the quality of the human environment could result from a proposed action. The environmental analysis in the EA provides the basis for this determination and must analyze the intensity or severity of the impact of an action and the significance of an action with respect to society as a whole, the affected region and interests, and the locality. If the action is determined not to be significant based on an analysis of relevant considerations, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. An environmental impact study (EIS) must be prepared if the proposed action may cause a significant impact on the quality of the human environment.

1.2.2 Regulatory Impact Review

The RIR is required for all regulatory actions undertaken by the National Marine Fisheries Service (NMFS) for significant Department of Commerce or NOAA policy changes that are of public interest. The RIR: (1) provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; (2) provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems; and (3) ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are "major" under criteria provided in Executive Order 12291 and whether or not proposed regulations will have a "significant impact" on a substantial number of small entities in compliance with the Regulatory Flexibility Act (P.L. 96-354, RFA). The primary purpose of the RFA is to relieve small businesses, small organizations, and small governmental jurisdictions (collectively, "small entities") of burdensome regulatory and record-keeping requirements. This RFA requires that the head of an agency must certify that the regulatory and record-keeping requirements, if promulgated, will not have a significant effect on a substantial number of small entities or provide sufficient justification to receive a waiver.

1.3 Purpose and Need for the Proposed Action

The domestic and foreign groundfish fisheries in the EEZ of the BSAI are managed by the Secretary according to the BSAI FMP, which was prepared by the Council under the authority of the Magnuson Act. The FMP is implemented by regulations for the foreign fishery at 50 CFR part 611 and for the U.S. fishery at 50 CFR part 675. General regulations that also pertain to the U.S. fishery are implemented at 50 CFR part 620. At times, amendments to the FMP and/or its implementing regulations are necessary to respond to fishery conservation and management issues.

The purpose of the proposed amendment is to provide a mechanism for the Council to spatially allocate the harvest of fish species, in the AI of the BSAI, and to facilitate a potential TAC increase

for Atka mackerel during 1993. Yearly catch allocations for the AI are based on estimates of the available exploitable biomass of each species or complex within the entire subarea. In recent years, commercial fishery catches in the AI, particularly of Atka mackerel, have become concentrated in a relatively small portion of the subarea. Spatially concentrated harvests in the AI could lead to localized depletions of fish species that exhibit only limited movements, such as Atka mackerel and Pacific ocean perch. In turn, localized depletions of these fish stocks could have adverse biological consequences for these species, and for marine mammals that prey upon them. Presently, the FMP does not provide for apportioning AI TACs in any geographical units smaller than the entire subarea.

1.4 Alternatives

Alternative 1 - Status quo, no action: Under this alternative, the AI would remain one single undivided subarea. Within the AI, groundfish species would continue to be managed as AI or BSAI TACs with no further spatial allocation. For 1993, the BSAI TAC for Atka mackerel would remain at 32,000 mt.

Alternative 2: Under this alternative, the AI would be separated into two districts by dividing the region at 177° E longitude for the purpose of spatially allocating TACs. Groundfish TACs could be apportioned between the two districts within the AI in future years. For 1993, the TAC for Atka mackerel could be increased, through allocation of non-specific operational reserves, up to 117,100 mt. As recommended by the SSC, any such increase would be proportional to the distribution of biomass of Atka mackerel.

Alternative 3 - (Council's preferred alternative): Under this alternative, the AI would be separated into three districts by dividing the region at 177° E and 177° W longitude for the purpose of spatially allocating TACs. As with Alternative 2, groundfish TACs could be apportioned among the three districts within the AI in future years. For 1993, the TAC for Atka mackerel could be increased, through allocation of non-specific operational reserves, up to 117,100 mt. As recommended by the SSC, any such increase would be proportional to the distribution of biomass of Atka mackerel; since the current TAC of 32,000 mt has already been harvested, primarily from the eastern AI district, any increase during 1993 would be apportioned to the central and western districts, in approximately equal amounts.

Alternatives Dropped from Further Consideration

Dividing the AI into four management districts (north and south of the island chain as well as an east/west subdivision) was rejected from further consideration. Four to six subareas would likely result in unmanageably small TACs in some locations, would greatly complicate the NMFS's work load and could cause increased scheduling costs for the fishery. The fishery for Atka mackerel has been concentrated in certain passes in the Aleutian chain. A north-south division would split some fishing grounds. For these reasons, this alternative is currently considered impracticable.

Dividing the AI into two districts at 180° W longitude was also considered and rejected. It was determined that the impacts of a division at 180° W longitude are similar to those resulting from a division at 178° W longitude, which was specifically requested as an alternative by the Council. Furthermore, a division at 180°W divides Petrel Bank, an important fishing area for Atka mackerel. This would unnecessarily complicate the reporting requirements for the fishery and would separate what is most likely a single fish stock into two management districts.

Although a split at 178° West longitude was specifically requested by the Council, Alternative 2 analyzes a split at 177° East. A split at 178° W would create a large district (west of 178° W) encompassing several major Atka mackerel fishing grounds. According to the most recent AI resource survey, 90% of the Atka mackerel biomass was detected west of 178° W. Thus it was postulated that if the Atka mackerel TACs increase in the future and 90% is apportioned to the typical fishing grounds west of 178° W, effort would increase but would unlikely be re-distributed within this district, making a split at 178° W unacceptable. A split at 177° E creates two districts, each with approximately 50% of the Atka mackerel biomass according to the 1991 NMFS survey data.

2.0 ENVIRONMENTAL AND BIOLOGICAL IMPACTS

2.1 Atka Mackerel Biology and Life History

Atka mackerel (*Pleurogrammus monopterygius*) are distributed from the east coast of the Kamchatka peninsula, throughout the Komandorskiye and AI, north to the Pribilof Islands in the eastern BS, and eastward through the Gulf of Alaska (GOA) to southeast Alaska. Their center of abundance according to past surveys has been in the AI, particularly from Buldir Island to Seguam Pass (Figure 2.1). Atka mackerel populations appear to be quite localized once they assume the demersal phase of their life history, and occur in large localized concentrations. They live in shallow water habitat with extremely hard, rough, and rocky bottom.

Atka mackerel eggs are demersal and sessile. Following hatching, Atka mackerel larvae migrate out to the open ocean as indicated by the frequent presence of larvae in stomachs of salmon caught in the open sea 150-500 miles from the coast (Gorbunova 1962). Young juveniles are pelagic and occur from nearshore to depths of 200 meters (m), and are also found in the upper 200 m as far as 800 kilometers (km) offshore. Older juveniles are found nearshore to 200 m, and adults are found nearshore to depths of 575 m but are mostly distributed less than 300 m.

Adult Atka mackerel have been characterized as semi-demersal and epipelagic. They are not bottom dwellers, but are apparently found in the water column near the bottom.

Atka mackerel reach sexual maturity in the third or fourth year at lengths of approximately 33-35 cm (Gorbunova 1962). They form large spawning schools and move inshore to shallow spawning grounds. Spawning takes place on the inner shelf at depths of 5-30 m. The timing is generally June-September in the Northeast Pacific. Spawning areas are located in the straits between islands, as in the passes of the Aleutian, Shumagin, and Commander Islands. Spawning schools are composed of fish 3 to 11 years of age with ages 5+ and 6+ predominating.

Atka mackerel begin recruiting to the commercial fishery around age 2 and appear to be fully recruited at age 4 (Lowe 1992). The oldest Atka mackerel aged at the Alaska Fisheries Science Center was 14 years old. Atka mackerel reach maximum lengths of approximately 50 centimeters (cm) and maximum weights of about 1.4 kilograms (kg).

Atka mackerel are primarily pelagic feeders but occasionally seek benthic prey. Adults feed primarily on euphausiids, and pelagic fish, although amphipods, copepods, shrimp, and molluscs are also important. They feed most actively at night in midwater or near the surface and return to the near-bottom during the day. Inshore foraging has been noted to occur May-October.

Atka mackerel are fairly important in the diet of a number of fish, birds, and mammals at various stages in their life cycle. The eggs are eaten by crustaceans, echinoderms, rock greenlings (*Hexagrammos lagocephalus*), and yellow Irish lords (*Hemilepidotus jordani*). Pelagic larvae and juveniles are frequently found in the stomach contents of salmon caught in the open ocean. Adults are eaten by Pacific cod (*Gadus macrocephalus*), Pacific halibut (*Hippoglossus stenoplepis*), northern fur seals (*Callorhinus usinus*), and Steller sea lions (*Eumetopias jubatus*) (Gorbunova 1962). The importance of Atka mackerel in the diets of marine mammals is further discussed in Section 2.4.

2.1.1 Movement and Migration

Atka mackerel do not perform extensive migrations but move inshore-offshore and vertically in the water column. Their spawning migrations are a fairly prominent feature of the AI at certain times of the year. During May and June they move inshore from pelagic waters for feeding and spawning. They have been observed to initially move to shallow waters of 70-150 m during the prespawning period (May-June), and then from June on to move close to shore (0-30 m) to spawn. Juveniles and adults have been noted to perform diel vertical migrations, occurring near the surface at night and at greater depths during the day (Gorbunova 1962).

2.1.2 Stock Structure Information

A morphological and meristic study suggested that there may be separate populations in the GOA and the AI (Levada 1979). This study was based on a comparison of samples collected off Kodiak Island in the central GOA, and the Rat Islands in the AI. There have not been any other studies to explore the possibility of sub-populations existing within the AI.

There are indications that Atka mackerel are very localized, and fish from various areas in the AI have shown significant differences in weight and length at age. Kimura and Ronholt (1988) estimated parameters of the von Bertalanffy length-age equation and a weight-length relationship using data collected in all areas during the 1980, 1983, and 1986 NMFS surveys. Sexes were combined in the analysis as sex was not determined to be an important differentiating variable for Atka mackerel growth. The observed mean length- and weight-at-age data for six areas in the AI are given in Table 2.1.

Atka mackerel exhibit large annual and geographic variability in length at age. Because survey data provided the most uniform sampling of the AI, data from these surveys were further analyzed to evaluate variability in growth (Kimura and Ronholt 1988). Length-at-age data from the 1980, 1983, and 1986 U.S.-Japan surveys, and the U.S.-U.S.S.R. surveys in 1982 and 1985 were analyzed by six areas. It appeared that length at age was smallest in the west and largest in the east. Analysis of variance was used to evaluate these differences statistically, and results showed that the differences among areas were statistically significant.

These spatial differences in length at age cannot be considered conclusive indications of separate populations within the AI, but rather are indications of this possibility, and at the very least show that Atka mackerel are very localized.

2.2 Atka Mackerel Survey Biomass Distribution

Atka mackerel is a difficult species to survey because: (1) they do not have a swim bladder, making them poor targets for hydroacoustic surveys; (2) they live in shallow water on hard, rough and rocky bottom which makes sampling with bottom trawls difficult; and (3) their schooling behavior makes the

species susceptible to large variances in catches which would greatly affect area-swept estimates of biomass. Despite these shortcomings of trawl surveys, the U.S.-Japan cooperative surveys conducted in 1980, 1983 and 1986 and the domestic survey of 1991 provide the only direct estimates of Atka mackerel population biomass from the entire AI region (see Kimura and Ronholt (1988) for a complete description of the surveys).

Figures 2.2 and 2.3 show the distribution and relative abundance of Atka mackerel based on each successful haul of the four surveys in the AI. Localized concentrations of Atka mackerel were found in Seguam Pass, Tanaga Pass, on Petrel Bank, south of Amchitka Island, west of Kiska Island, on Buldir and Tahoma Reefs, and on Stalemate Bank.

Biomass estimates of Atka mackerel were calculated for each survey area and subarea shown in Figure 2.4 and for each of the following depth strata within each subarea: 1-100 m, 101-200 m, 201-300 m, 301-500 m, and 501-900 m (Table 2.2). In the 1980 survey, no successful sampling occurred in shallow waters around Kiska and Amchitka Islands, and seven depth/subarea strata in waters less than 200 m depth (where Atka mackerel are likely to be found). In the 1983 survey, four 1-100 m strata in different subareas were not sampled, and this survey had the fewest successful stations of all four surveys. In the 1986 survey, only three 1-100 m subarea strata were not sampled but the survey vessels were excluded from waters surrounding Adak Island by the US Navy. In 1991, no depth/subarea strata in waters less than 500 m depth were missed and the area around Adak Island was sampled.

Trawl survey biomass estimates of Atka mackerel in the AI (170°W-170°E) increased from 130,500 mt in 1980, 343,300 mt in 1983, 634,000 mt in 1986 to 688,200 mt in 1991. These values may differ from other values reported (in Lowe 1992) due to differences in fishing power corrections between vessels. The respective variance estimates for these mean values are high, and are: 1980: 4.36×10^{11}; 1983: 6.82×10^{11}; 1986: 1.65×10^{13}; and 1991: 1.24×10^{12}.

Distribution of the survey Atka mackerel biomass in the districts proposed in Alternatives 2 and 3 are shown in Table 2.3 and Figure 2.5. Based on these surveys, the distribution of biomass has changed, with less concentrated in the eastern (170°-177°W) district, and more to the west, particularly the central (177°W-177°E) district. In the 1980 and 1983 surveys, approximately 40% of the Atka mackerel biomass was located in the eastern district, but this percentage declined to between 6-11% in 1986 and 1991. The biomass estimate for the eastern district varied between 40,000 and 140,000 mt in these four surveys, and was approximately 74,000 mt in 1991. The largest differences in district biomass between surveys were noted in the central (177°W-177°E) and western (177°-170°E) districts. Between 1983 and 1986, the estimated biomass and percentage of total increased from 50,000 mt to 545,000 mt, and 15% to 86%, respectively, in the central district, but declined to 307,000 mt and 45% in 1991. In the western district, the biomass varied between 33,000 mt and 152,000 mt (and the percentage between 8% and 44% of the total) between 1980-1986, and then increased to 306,000 mt and 44% of the total in 1991.

While these surveys provide the best absolute estimates of the size and distribution of the Atka mackerel population available, caution in using and interpreting them is necessary due to variations in sampling intensity and the highly aggregated nature of the Atka mackerel population. The difficulties associated with making precise area-swept estimates of schooling fish are evident in the variance estimates for each survey biomass as well as the details of the 1983, 1986, and 1991 survey results. In 1983, 17 successful hauls (of 213 in the survey area) accounted for over 70% of the survey's Atka mackerel biomass, while in 1986, 13 of 319 successful hauls accounted for over 80% of the survey biomass. Furthermore, in the 1986 survey, the Atka mackerel biomass estimate for a single

subarea/depth stratum that was sampled with three hauls (the 1-100 m depth strata in the eastern subarea of the southwest area) accounted for 76%, or 481,000 mt, of the entire Aleutian area biomass of Atka mackerel. It is this single strata (sampled by three hauls) that accounts for the large difference in district biomass distribution between 1983 and 1986 in Figure 2.5. In the 1991 survey, biomass appeared to be less unevenly distributed, with 11 of 279 hauls accounting for over 50% of the survey biomass. However, the two largest single strata biomass estimates in the 1991 survey were each based on only one successful haul in each strata, and accounted for 205,681 mt, or 30% of the total AI Atka mackerel biomass.

Length-frequencies of Atka mackerel sampled in each area, subarea and depth strata during the 1991 survey are shown in Figure 2.6. Size generally increases with depth (with some exceptions), and most Atka mackerel were between 25-45 cm in length. Some older fish > 50 cm were found between 100-200 m, between 170°-174°W south of the island chain (survey area 2, district 3), which is the Seguam Island and Pass area. Small fish < 25 cm were found in the far western AI (survey area 1, district 1), near Amchitka Island and on Petrel Bank (survey area 3, district 2), and in the Delarof Islands and on Petrel Spur (survey area 4, district 1). Very few fish smaller than 20 cm were collected in any of the four surveys.

2.3 Atka Mackerel Fishery

2.3.1 Catch and Quota History

Catches from 1978-1992 are shown below; "JVP" is joint venture processing in which U.S. catcher vessels deliver to foreign processors, and "DAP" is domestic annual processing in which U.S. catch vessels deliver to U.S. processors:

	Eastern Bering Sea				Aleutians Islands			
Year	Foreign	Domestic		Total	Foreign	Domestic		Total
		JVP	DAP			JVP	DAP	
1978	831	0	0	831	23,418	0	0	23,418
1979	1,985	0	0	1,985	21,279	0	0	21,279
1980	4,690	265	0	4,955	15,533	0	0	15,533
1981	3,027	0	0	3,027	15,028	1,633	0	16,661
1982	282	46	0	328	7,117	12,429	0	19,546
1983	140	1	0	141	1,074	10,511	0	11,585
1984	41	16	0	57	71	35,927	0	35,998
1985	1	3	0	4	0	37,856	0	37,856
1986	6	6	0	12	0	31,978	0	31,978
1987	tr	12	0	12	0	30,049	0	30,049
1988	0	43	385	428	0	19,577	2,080	21,656
1989	0	56	3,070	3,126	0	0	14,868	14,868
1990	0	0	480	480	0	0	21,725	21,725
1991	0	0	1,836	1,836	0	0	21,004	21,004
1992*	0	0	2,369	2,369	0	0	43,857	43,857

* Source: Pacific Fisheries Information Network (PacFIN), 1992 catch is current as of 10/13/92.

A history of the total BSAI catch and the corresponding TAC for 1978-1992 are given below:

	Bering Sea/Aleutian Islands Catch (mt)	Total Allowable Catch (mt)
1978	24,249	24,800
1979	23,264	24,800
1980	20,488	24,800
1981	19,688	24,800
1982	19,874	24,800
1983	11,726	24,800
1984	36,055	23,130
1985	37,860	37,700
1986	31,990	30,800
1987	30,061	30,800
1988	22,084	21,000
1989	17,994	20,285
1990	22,205	23,500
1991	22,840	24,000
1992	46,226*	43,000
1993	**	32,000

* Source: PacFIN, 1992 catch is current as of 10/13/92.
** 1993 catch data not available.

Annual catches of Atka mackerel in the BSAI increased during the 1970s reaching an initial peak of 24,250 mt in 1978. From 1979 to 1982 catches gradually declined, then dropped sharply to 11,726 mt in 1983. The decline from 1980 to 1983 was due to changes in the target species and allocations to the nations fishing rather than changes in stock abundance. From 1984 to 1987 catches were at record high levels, averaging 34,000 mt annually. The 1992 Atka mackerel quota (43,000 mt) was reached early in the year, and the directed fishery was shut down on April 16. The 1992 catch of 43,875 mt is the largest reported Atka mackerel catch taken in the history of the fishery.

The TAC values for 1978-1983 were set at 24,800 mt, which was 75% of an unverified Soviet estimate of maximum sustainable yield (MSY) of 33,000 mt (NPFMC 1979). The 1984 TAC of 23,130 mt was determined by adjusting the equilibrium yield (EY) estimate of 25,000 mt downward, so that the aggregate sum of TACs totalled 2 million mt (the OY cap). In 1985, the TAC was raised to 37,700 mt, which was based on an updated MSY estimate of 38,700 mt determined from Stock Reduction Analysis. The 1986-87 TACs (30,800 mt) are equal to the estimated EY. The 1988 TAC of 21,000 mt is equal to the acceptable biological catch (ABC) which was based on a yield per recruit analysis and the $F_{0.1}$ fishing mortality rate (NPFMC 1987). The 1989 TAC was based on the ABC determined from catch-at-age analysis which also equaled 21,000 mt, adjusted downward so that the sum of the groundfish TACs totalled 2 million mt. The 1990 TAC of 23,500 mt was based on an updated ABC estimate of 24,000 mt determined from catch-at-age analysis, and adjusted so that the sum of the TACs totalled 2 million mt. The 1991 TAC of 24,000 mt equalled the average catches from 1978-1990.

The 1992-1993 TACs are based on results from stock synthesis analysis, which incorporated the latest survey biomass (1991 AI). A new estimate of biomass in excess of 0.5 million mt coupled with a fishing mortality rate equal to the natural mortality rate (M) of 0.30, suggested that acceptable harvest levels could be much larger that those recommended in the 1980s. Concern for the resource and the uncertainty involved led to a reluctance to implement radically higher catch levels immediately. An additional problem was that the majority of the biomass (73%) was found west of 180°W, while the fishery for the most part was prosecuted east of 180°W. The SSC recommended phasing in the new ABC estimates over a 6-year period, adopting the current exploitable biomass estimate and raising the exploitation rate in steps from M/6 in 1992 to M/3 in 1993, and M in 1997. Thus in 1992, the Council set ABC and TAC equal to M/6 multiplied by the exploitable biomass estimate which provided a value of 43,000 mt. In the 1993 assessment, M/3 multiplied by an updated assessment of current biomass provided an ABC of 117,100 mt (Lowe 1992). Continued concern for the resource due to the disproportionate distribution of the catch relative to NMFS survey biomass distribution, led the SSC to recommend an ABC of 32,100 mt (the portion of the harvest that could be taken east of 180°W based on the survey). The SSC stated that if a plan amendment were in place to subdivide the Aleutian district, the ABC would be the full 117,100 mt (SSC minutes, Dec. 1992). The Council set ABC equal to 117,100 mt and the TAC at 32,000 mt for the 1993 fishery.

2.3.2 Number and Types of Vessels

Prior to 1989-90, the Atka mackerel fishery in the AI was conducted by foreign motherships and domestic catcher vessels (the joint-venture fisheries of 1981-1988) and foreign catcher-processors (the foreign fisheries of the 1970s through 1984). In the last 3 years (1990-92), the Atka mackerel fishery has been almost exclusively conducted by domestic catcher-processing vessels (offshore sector). In 1991 and 1992, there were 29 and 25 catcher-processors, respectively, targeting on Atka mackerel in the AI subarea based on weekly processing records. In 1991, only one mothership (with two catcher vessels supplying it) was involved in the Aleutian Atka mackerel fishery, while in 1992, there were two motherships (J. Gharrett, NMFS Regional Office, Juneau, AK). Using target fishery definitions based on the species composition of individual hauls (Table 2.4), the NORPAC observer database yielded 18, 24, and 24 vessels in 1990, 1991, and 1992, respectively, that targeted on and caught at least 100 mt of Atka mackerel in the AI.

Atka mackerel is caught almost exclusively with trawls fished on the bottom. During the last 3 years, more than 99.2% of the Atka mackerel landed were caught with bottom trawls, 0.3-0.7% caught by pelagic trawls, and small amounts using pots and longlines (NORPAC observer data base).

2.3.3 Fishing Patterns

The patterns of the Atka mackerel fishery generally reflect the behavior of the species: (1) the fishery is highly localized and occurs in the same few locations each year; (2) the schooling semi-pelagic nature of the species makes it particularly susceptible to trawl gear fished on the bottom where the larger, older fish are located; and (3) trawling occurs almost exclusively at depths less than 200 m, where bottom trawl surveys have found over 97% of the Atka mackerel biomass in the AI since 1980. The following briefly outlines the recent temporal and spatial distribution of the Atka mackerel fishery in the AI, and relates this to what is known about the distribution of the Atka mackerel stock(s) in the management subarea. Observer data for 1989 is particularly sparse because the foreign and JVP fisheries had largely been replaced by domestic fisheries by this time, but the domestic observer program had not yet been fully implemented. In the AI, Atka mackerel have been fished primarily in only four locations over the last 10 years (1982-92; see Figures 2.7-22):

(1) in Seguam Pass and approximately 30m SSE of Seguam Island (171-172°W approximate longitude);
(2) in Tanaga Pass and within the Delarof Islands (178°W approximate longitude);
(3) on Petrel Bank and Spur (179°W approximate longitude); and
(4) in two locations south of Amchitka Island (178°-179°E approximate longitude).

Three of the locations listed above are in the central AI (177°W-177°E), while Seguam is the only one in the eastern AI (170°-177°W) and is the most important in terms of percentage of landed catch each year (Table 2.5). None of the important Aleutian Atka mackerel fishing locations of the last 10 years are in the western AI (177°-170°E).

In the early 1970s, most Atka mackerel catches occurred in the western AI (west of 180°W) on Tahoma and Buldir Reefs and on Stalemate Bank in the 177°-170°E district. Fishing effort moved progressively eastward in the late 1970s with significant landings coming from the central and eastern AI. From 1982-84, more than 80% of the Atka mackerel landed came from the Seguam location, while the three locations in the 177°W-177°E district yielded between 33-73% of the catch between 1985-87 with Seguam yielding the remainder. Since 1990, between 56-68% of the Atka mackerel landed in the AI have come from Seguam. In 1982, 1984, 1990 and 1992, there was some effort for Atka mackerel in the 177°-170°E district on Buldir and Tahoma reefs, but this yielded only 1% of the catch or less.

The Atka mackerel catch distribution has differed greatly from the biomass distribution as revealed by bottom trawl surveys. Since 1980, the percentage harvested from the eastern AI (170°-177°W) has far exceeded the proportion of biomass found there, while the percentage harvested from the western AI (177°-170°E) has been far less than the proportion of biomass in that area (Tables 2.2 and 2.5). In recent years (1990-92), the percentage of Atka mackerel landed from the eastern AI (170°-177°W) has ranged between 56-68%, while the district's percentage of the 1991 survey biomass was only 11%. In the western AI (177°-170°E), the 1991 survey found over 44% of the Atka mackerel biomass but less than 1% of the catch has been harvested there. The percentages of Atka mackerel caught and biomass found in the central AI (177°W-177°E) have been similar since 1990, with catch percentages ranging between 32-44% and a 1991 survey biomass percentage of 45%.

Because of the shallow habitats favored by Atka mackerel and the localized nature of the fishery, a large percentage of the harvest between 1980-91 was caught near Steller sea lion rookeries in the BSAI (Table 2.6). The Steller sea lion was listed as threatened under the Endangered Species Act (ESA) in April 1990. From 1982-1986, between 70-80% of all BSAI landings of Atka mackerel were caught within 10 nautical miles (nm) and between 83-98% within 20 nm of Steller sea lion rookeries. The principal rookeries near where this fishing effort occurred are: (1) on Seguam and Agligadak Islands in the 170°-177°W district; (2) in the Delarofs Islands (on Tag and Ulak Islands and Gramp Rock) in the 177°W-177°E district; and (3) on Amchitka and Rat Island (East Cape and Column Rocks near Amchitka Island, and Ayugadak Point on Rat Island) also in the 177°W-177°E district. In 1987-88, less than 50% of the Atka mackerel landings were harvested within 20 nm of sea lion rookeries as more effort was shifted to Petrel Bank and Spur. In 1990-91, however, there was a return to the pattern observed between 1982-86, with 70-80% caught within 10 nm and 90% within 20 nm of sea lion rookeries. Beginning in 1992, trawling was prohibited within 20 nm of Seguam and Agligadak island rookeries during the BSAI pollock "A" season (January through April 15 or until the TAC is reached) and within 10 nm of all rookeries year-round. The intent of these actions was to exclude trawl fishing activity from areas known to be important for sea lion foraging and reproduction. As a result, the percentages of Atka mackerel harvested within 10 and 20 nautical miles (nm) of rookeries declined to 0 and 17% in 1992 (Table 2.6).

From 1982-88, the Atka mackerel fishery was conducted in the second and third quarters of the year, with most of the harvest usually landed in the second quarter (Table 2.7). The fishery generally lasted for several months during the late spring and summer each year. Beginning in 1990, the fishery has occurred earlier in the year and lasted for a shorter period of time. In 1990, almost 94% of the catch was harvested in the second quarter, with over half landed in June. In 1991, 97% of the catch was harvested in the first quarter with over half landed in late March. In 1992, significant harvests occurred in both the first and second quarters, but over half the landings occurred between mid-March and mid-April.

2.3.4 Sizes of Atka Mackerel Caught

Length distributions from the domestic fishery in 1989, 1990, and 1991 are shown in Figure 2.23. Mean length was 36.6 cm in 1989, 38.8 cm in 1990, and 38.2 cm in 1991. Since very few Atka mackerel were sampled for length data in 1989, the data are probably not a good representation of the length distribution of Atka mackerel in the 1989 commercial fishery. The 1990 and 1991 data show few fish less than 35 cm, and that for the most part, the fishery harvested fish 35 to 45 cm in size.

Fishery selectivity patterns were estimated by the stock synthesis model for the time periods of 1972-1983 and 1984-1991 (Lowe 1992). Prior to 1984 the fishery basically consisted of fish 2-7 years old. The oldest fish during this time period was 9 years old. After 1983, fish greater than 7 years old appeared in the fishery, with the oldest fish aged at 14 years in the 1990 fishery. The estimated selectivity-at-age for the fishery is dome-shaped (Figure 2.24). The age composition of the recent fishery consists mostly of fish 3-9 years old.

2.3.5 Bycatch of Prohibited Species, Other Allocated Groundfish, and Forage Species by the Atka Mackerel Fishery

Since the domestic Atka mackerel fishery has been concentrated east of 180°W, the small amount of data available that can address regional differences in bycatch rates of prohibited, other allocated groundfish and important forage species within the AI was collected by foreign and joint-venture fishery observers from 1977-88. These are summarized below and in Table 2.8, along with data collected from 1990-92 from the domestic fishery.

Prohibited Species: Compared to other bottom trawl fisheries (e.g., BS pollock, cod, and rockfish), the Atka mackerel fishery has relatively low bycatch rates of prohibited species (Pacific halibut, king and Tanner crabs, herring, and salmon), primarily because it is conducted in the AI away from centers of abundance of these species on the eastern BS shelf (data for halibut in Tables 2.9). The Atka mackerel fishery is currently (1993) included within the BSAI Other Trawl Fisheries category for the Vessel Incentive Program, but has bycatch rates of halibut and king crab considerably lower than the category's incentive program rate standards for 1993 (Table 2.10).

<u>Halibut</u> - Mean 1977-88 bycatch rates of halibut decreased from 2.8 kg/mt Atka mackerel in the 170°-177°W district to less than 0.1 kg/mt Atka mackerel in the 177°-170°E district, with corresponding decreases in the maximum rates observed. The recent domestic fishery has had rates between 0.5-3.3 kg/mt Atka mackerel in the eastern and central districts, considerably below the vessel incentive program rates for BSAI other trawl fisheries (Table 2.10).

<u>King Crab</u> - Mean and maximum bycatch rates of king crabs were at least three times higher in the eastern (0.043 crabs/mt Atka mackerel) than in the central and western districts from 1977-88. Rates during the domestic 1990-92 fisheries have also been generally low, except for 0.472 crab/mt rate

observed in 1992 in the eastern district. Even this rate is considerably below the vessel incentive program rate for BSAI other trawl fisheries (Table 2.10).

Tanner Crab and Herring - Bycatch rates of Tanner crab and herring by Atka mackerel fisheries from 1977-92 were extremely low and should not be affected under any of the proposed alternatives.

Salmon - Salmon bycatch rates have generally been higher in the eastern district than in the central and western districts, and may have been higher in the late 1980s and 1990 than from 1984-86. Salmon bycatch rates of the recent domestic Atka mackerel fishery have been very low.

Other Allocated Groundfish: Other allocated groundfish species caught by Atka mackerel fisheries include Pacific cod, walleye pollock, Pacific ocean perch (POP), and other rockfish. Flatfish and sablefish are not caught by the Atka mackerel fishery to any great extent.

Pacific cod - Annual Pacific cod bycatch in a district has been as high as 22% by weight of the Atka mackerel caught (1984 JVP fishery in the eastern district), but has usually been in the 1-15% range. Cod bycatch rates have been higher in the eastern district than in districts to the west. Mean district bycatch rates by the foreign and JVP fisheries of 1977-88 decreased from east to west, from 14% in the eastern district (maximum annual rate of 44%) to 11% in the central district (maximum of 34%) to less than 1% in the western district (maximum of 6%).

Data collected onboard domestic vessels in 1990-92 suggest that cod bycatch rates were similar to the mean 1977-88 rates in 1990 and decreased from this level in 1991-92. In 1990 and 1991, cod bycatch was higher in the central district (14% and 8%, respectively) than to the east (11% and 6%, respectively), but this pattern was reversed in 1992 (8% in the eastern and 5% in the central district).

Walleye pollock - Pollock bycatch rates by the Atka mackerel fishery have declined to low levels in recent years and have generally been higher in the eastern district than further west. Pollock bycatch rates by the foreign and JVP fisheries were higher in the eastern district (mean rate of 8%) than in the central and western districts (1% and 0.5%, respectively). The domestic fishery of 1990-92 had lower pollock bycatch rates than the foreign and JVP fisheries that preceded it, reflecting the declining abundance and aging of the pollock population in the AI especially in shallow areas inhabited by Atka mackerel (Wespestad and Dawson 1992). Pollock bycatch rates in 1990 were approximately 3% (in both the eastern and central districts), while in 1991, rates remained the same in the central district but declined to under 1% in the eastern district. Rates in all areas in 1992 were below 1%.

Pacific ocean perch (POP) and Other Rockfish - Bycatch of POP and other rockfish by the Atka mackerel fishery has generally been higher in the western district than in the central and eastern districts, and may be increasing. From 1977-88, foreign and JVP fisheries averaged 2% and 4% bycatch rates of POP and all rockfish, respectively, in the eastern district, compared with mean rates below 1% and 2%, respectively, in the eastern and central districts. Bycatch rates of POP by the domestic 1990-92 Atka mackerel fishery have increased from less than 1% in the eastern and central districts in 1990 to between 2-3% in 1991-92. Similarly, bycatch rates of all rockfish increased from 2-4% in 1990 to between 4-8% in 1992, with higher rates observed in the central than in the eastern district. Shifting effort for Atka mackerel to the western district could increase the bycatch of POP and other rockfish by this fishery.

Forage Species for Marine Mammals and Seabirds: Data in the observer program data base suggests that bycatch rates of marine mammal and seabird forage species (other than Atka mackerel itself) by the Atka mackerel fishery are very low. Observer data in NORPAC were investigated concerning the bycatch of Pacific sandlance, herring, smelts (capelin, eulachon, and other osmerids), squid and octopus by the Atka mackerel fishery. No data were available concerning the bycatch of Pacific sandlance, herring, and smelts, suggesting that bycatch of these species by the fishery is small. Data on bycatch of pollock (described above) suggests low bycatch rates of this species. Data on size composition of the pollock caught by Atka mackerel trawlers are not available, but are most likely in the same range as the Atka mackerel retained (most > 35 cm; see Section 2.3.4).

Squid and octopus bycatch rates by the Atka mackerel fishery have also been low. Mean squid bycatch rates by foreign and JVP fisheries in all districts were less than 1 kg squid/mt of Atka mackerel, with a maximum annual rate of 5 kg squid/mt. The mean rate was highest in the western district (0.5 kg squid/mt), second highest in the eastern district (0.1 kg/mt) and lowest in the central district (0.04 kg/mt). Squid bycatch rates by the recent domestic fishery have been lower than those of foreign and JVP fisheries, with all less than 0.3 kg/mt, and most less than 0.1 kg/mt.

Annual district octopus bycatch rates by the Atka mackerel fishery (foreign, JVP, and domestic) have been low, with all less than 0.4 kg octopus/mt Atka mackerel (observed in the eastern district). Mean 1977-88 rates for the foreign and JVP fisheries were highest in the eastern district (0.08 kg/mt) and less than 0.01 kg/mt in the central and western districts. During the domestic fisheries of 1990-92, octopus bycatch rates have also been low, with maximum rates of 0.1 kg/mt observed in the eastern district in 1991; all other district octopus bycatch rates from 1990-92 were 0.05 kg/mt or less.

2.4 Marine mammals

There are many cetacean species that occur in Alaskan waters, which have the potential for interaction with groundfish fisheries in the AI. Four species are listed as endangered under the ESA [fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), humpback whale (*Megaptera novaeangliae*), and sperm whale (*Physeter macrocephalus*)] while the others are small- to medium-sized cetaceans that currently are not listed under the ESA [minke whale (*Balaenoptera acutorostrata*), killer whale (*Orcinus orca*), Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*, and the beaked whales (e.g., *Berardius bairdii* and *Mesoplodon* spp.)].

There are also at least three pinniped species as well as the sea otter (*Enhydra lutris*) that occur in the AI, which have the potential for interaction with groundfish fisheries. The three pinniped species [Steller sea lions (*Eumetopias jubatus*), northern fur seals (*Callorhinus ursinus*), Pacific harbor seals (*Phoca vitulina*)] have each experienced declines in their population sizes over the last 30 years. The Steller sea lion was listed as threatened under the ESA in 1990.

Of these marine mammals, the sperm whale and the sea otter are unlikely to be affected by the proposed action due to their diet (squid and deepwater fishes for sperm whales; echinoderms and molluscs for otters) and foraging areas (generally in waters deeper (for sperm whales) and shallower (for sea otters) than those fished by the Atka mackerel fishery). The potential interactions between Atka mackerel fisheries and the remaining marine mammals will be discussed after brief reviews of their natural history, and in the case of the Steller sea lion, their recent affects on fisheries management.

Fin Whales: Fin whales range from the North Pacific Ocean to the BS and, rarely, the Chukchi Sea. The North Pacific population has been estimated from 14,620 to 18,360 individuals (Braham 1984); it is estimated that about 5,000 enter the BS during summer through many of the passes in the Aleutian Island chain (Morris 1981). Fin whales feed by engulfing large concentrations of, among other prey, euphausiids, anchovies, capelin, herring, and juvenile pollock.

Fin whales generally winter off southern California and Baja California, although a few whales overwinter in the GOA and near the Commander Islands (Berzin and Rovnin 1966). Fin whales entering the BS are generally separated into two groups (Nasu 1974). A group consisting mostly of mature males and females without calves migrate along the shelf break to Cape Navarin and more northern waters. A group of lactating females and immature whales summer along the shelf break between the Pribilof Islands and Unimak Pass. Other summer concentrations occur in the GOA and along the Aleutian Chain. Historically, a summer concentration was located between St. Matthew and Nunivak Islands (Berzin and Rovnin 1966). Although the fall migration may begin in September, some fin whales may remain in the AI and the GOA until November and possibly overwinter in these areas.

Sei Whales: Sei whales occur in all the world's oceans. The North Pacific population is estimated at between 22,000 and 37,000 individuals (Braham 1984). The principal food source is copepods, which the sei whale catches by skimming. Other food sources include euphausiids, herring, sand lance, and pollock. They are most commonly found in the GOA and southeast of the Aleutian Chain area during the summer months (May and June) and migrate to southern latitudes during winter. Migration periods and routes are similar to those of the fin whales. Sei whales are rarely seen north of the AI (Rice 1974). Braham et al. (1977) reported one sighting in the Fox Islands and one sighting east of the Pribilof Islands.

Humpback Whale: In the North Pacific, humpback whales are distributed from the tropics north to 70° N latitude in the Chukchi Sea. In the North Pacific, the humpback population is estimated at <1,200 individuals (Braham 1984), and Morris (1981) estimated that up to 200 humpbacks were distributed throughout the BS in the summer. Humpbacks feed on euphausiids and small schooling fish that they capture through lunging or a modified skim-feeding action. Tomilin (1967) stated that euphausiids, arctic cod, herring, capelin, saffron cod, pollock, mysids, pelagic amphipods, and shrimp were the most important humpback food items (Tomilin 1967), while Frost and Lowry (1981) also included Atka mackerel, sand lance, salmon, and rockfish.

The summer range of humpbacks extends from the coast of California northward to the southern portion of the Chukchi Sea. The whales migrate from wintering grounds off Hawaii and Mexico north to the GOA (early April), the eastern Aleutian Islands (late June), and northward to the Bering and Chukchi Seas (July through September). The whales are found in the BS from May through November; the autumn migration begins in September. Photo-identification of humpbacks indicates that migratory routes exist between Hawaii and Prince William Sound and southeastern Alaska, and between Mexico and California and southeastern Alaska. Soviet and Japanese tagging and whaling records indicate that humpbacks heading for the St. George Basin area migrate between Japan and the southeastern BS (Hameedi 1981). Berzin and Rovnin (1966) postulated that the summering humpbacks along the Soviet coast overwinter off Japan but that some mingling occurs with whales that overwinter around Hawaii and Mexico.

Minke Whale: Minke whales are the smallest of the baleen whales, and inhabit all oceans of the world except equatorial regions. The North Pacific population is classified as abundant, but no precise estimate of the population exists. Minke whales feed locally on abundant fish, euphausiids,

and copepods. Euphausiids are the preferred prey in the North Pacific, followed by schooling fish, and copepods. From March through December, minke whales are seen feeding most frequently in the lagoons and coastal waters along the northern shore of the Alaska Peninsula (i.e., Port Moller and Nelson Lagoon).

The species occurs broadly over the North Pacific and into the southern Chukchi Sea during the summer months and migrates to lower latitudes during the winter. Minke whales apparently occur in the BS on a year-round basis, with concentrations near the AI and the Pribilof Islands during the summer. Over 95% of minke whale sightings in the NMFS Platform of Opportunity (POP) data base were within the 200-m isobath, and most were in shallow coastal waters (Morris 1981). However, this distribution may be an artifact of effort distribution in the POP database.

Killer Whale: Killer whales are observed in all major oceans and seas of the world and appear to increase in abundance shoreward and toward the poles of both hemispheres (Mitchell 1975). Killer whales are top-level carnivores of the marine ecosystem with diets that vary regionally (Heyning and Dahlheim 1988). Although primarily fish eaters, killer whales are known to prey on other cetaceans, pinnipeds, and seabirds (Dahlheim 1981). Killer whales have been documented to take significant numbers of fish off longlines in the AI and GOA black cod fisheries.

Killer whales have been observed as far north as the Chukchi and Beaufort Seas (Braham and Dahlheim 1982; Lowry et al. 1987). Year-round occurrence may occur within Alaskan waters; however, their movements are poorly understood (Braham and Dahlheim 1982). Whales are forced southward from the Chukchi and northern BS with the advancing pack ice and, under such circumstances, long-range movements may occur. In ice-free waters, more restricted movements may occur. Killer whale concentrations have been noted in coastal waters, continental shelf waters, and neritic zones. These areas of killer whale abundance are of particular interest as they overlap areas of high abundance of prey. NMFS conducted a vessel survey for killer whales in July-August 1992 in the coastal areas and along the continental shelves of the GOA (Kodiak Island and west), BS (Unimak Pass northwest to the Pribilof Islands) and in the eastern AI as far west as Atka Island (174°W). Using photo-identification techniques, NMFS observed 184 different whales and concluded that the total population in the GOA and BSAI is probably in the hundreds of animals. This population estimate is similar to two others made in the last 10 years in the same area by Leatherwood et al. (1983) and Brueggeman (1987), both of whom conducted aerial surveys.

Dall's Porpoise: This species ranges from Northern Baja California, along the western coast of North America, and across the North Pacific Ocean to the coastal waters of Japan. The estimated size of the North Pacific Dall's porpoise population (not including coastal waters from California to Washington) north of 40° N to the AI is approximately 1,349,000 animals (Turnock 1987; and Bouchet et al. 1986). In the BS the population is estimated to be 212,000 (Turnock 1987). Dall's porpoise feed predominantly on squid and mesopelagic fish, predominately myctophids. Examination of stomach contents of Dall's porpoise incidentally taken in the Japanese high seas salmon fishery in 1978-79 revealed a frequency of occurrence of Atka mackerel of 13% in one year (Crawford 1981). The exact location of collection of the animals is not known, but the Japanese salmon fishery operated in the AI west of 176°E between Buldir Island and the US-Russia convention line along with other areas to the north (in the BS "donut hole") and south.

The northern limit of the species is generally Cape Navarin in the BS, although they have been observed as far north as 66° N latitude (Morris et al. 1983). Dall's porpoise are sighted in Bristol Bay through the year and in the Navarin Basin area from spring through fall (Brueggeman et al. 1984). They can occur in shallow waters but have been most frequently sighted in waters over 100

meters deep. Concentrations occur from June through November along the shelf break from the Pribilof Islands to Cape Navarin. Migratory movements are not well understood, but available information suggests local migrations along the coast and seasonal onshore/offshore movements. However, data from throughout the North Pacific and BS show that Dall's porpoise reproduce annually and seasonally, starting in late July or early August to September (Jones et al. 1985).

Harbor Porpoise: The harbor porpoise is a boreal-temperate species along the North Pacific coast from Point Barrow, Alaska, to central California. Numbers of harbor porpoise in Alaskan waters are unknown. They feed primarily on small gadoid and clupeoid fish, such as cod, herring, and also on mackerel.

Harbor porpoise are generally sighted singly or in pairs. Sightings in the BS are reported in Frost et al. (1982). Neave and Wright (1969) reported that harbor porpoise in the western North Atlantic move north in late May and south in early October. Harbor porpoise are generally seen in coastal environments such as harbors, bays, and the mouths of rivers. Mating probably occurs from June or July through October, with peak calving in May and June.

Pacific White-Sided Dolphin: This species ranges from Baja California to the AI, as well as off the coast of Japan. The numbers of this dolphin found in Alaska is unknown. They are opportunistic feeders that eat a variety of fish and squid. Pacific white-sided dolphin are observed north of the AI, primarily in waters 100 to 200 m deep. Most abundant in the summer months, this species concentrates in areas of high fish abundance, such as along the shelf break. Presumably, the dolphins shift their distribution farther north during the summer season and also may move offshore (Morris et al. 1983). They are frequently observed in groups exceeding 100 individuals; groups of between 500 and 2,000 individuals have been sighted.

Beaked whales - Little is known about the abundances, seasonal distribution, and food habits of the North Pacific beaked whales, such as Baird's beaked whale (Berardius bairdii) or members of the genus Mesoplodon (such as M. hectori, M. ginkgodens, M. carlhubbsi, and M. stejnegeri). It is thought that most reside in deep, offshore waters, where they feed primarily on squid. However, Baird's beaked whale has been found to feed on various fish species (Nishiwaki and Oguro 1971). Most of what is known about their distribution comes from beach strandings. If they enter the BS during the summer, food availability, particularly schooling fish and squid, in the AI passes in spring and fall may be important.

Steller sea lion - The geographic range of the Steller sea lion extends from Hokkaido, Japan, through the Kuril Islands and Okhotsk Sea, AI and central BS, GOA, Southeastern Alaska, and south to central California. The AI and GOA are the centers of distribution and abundance, respectively, for the species. At least 38 rookeries are located in the AI, Bering Sea, coastal GOA, and southeastern Alaska. Haul outs are rare north of the Pribilof Islands.

Sea lions do not migrate; however, there is a definite dispersal from rookeries following the summer breeding season. At least some adult females (those with dependent offspring and some others as well) remain associated with the summer rookery sites throughout the year, while others may disperse away. The large concentrations of animals found at seasonal haul outs (e.g., Puale Bay in the spring) were probably due to animals moving to those haul outs because of seasonal prey availability nearby. One major difference between summer and winter movements is that females appear to be at sea longer in the winter.

Adult males are completely absent from rookery sites during the nonbreeding season. In late summer and early fall, AI and BS animals reach St. Lawrence Island and the Bering Strait (Kenyon and Rice

1961). Matthew and Hall Islands in summer. Movement of males to the ice edge apparently occurs in winter. In spring (March-April) some sea lions utilize the ice front prior to the disintegration of ice in the central BS, especially in the vicinity of the shelfbreak (Burns et al. 1980; NMFS unpub. data 1983). Seasonal movements of GOA male sea lions are unknown.

Sighting data indicates that many sea lions forage from the continental slope shoreward; however, they have been observed in excess of 150 km offshore (Kajimura and Loughlin 1988). Data from one satellite radio tagged female from Marmot Island indicated that this animal typically foraged 100 km east of the island (on the south edge of Portlock Bank). The destination of one trip was over 200 km offshore (Merrick unpub. data 1990).

Food habits studies indicate that schooling fishes, particularly pollock, herring, capelin and sand lance, are the major prey of Steller sea lions in Alaska, but their diet also includes squid and octopus (Lowry et al. 1982, 1989). Size of pollock consumed by sea lions ranges from age 1 fish to adults greater than age 10, however most of the pollock consumed are ages 1 to 3 and the average size is under 30 cm (Lowry et al. 1989). Recently collected (NMFS, 1990-91) and unpublished data on food habits of sea lions based on analyses of scat collected throughout the AI suggests that Atka mackerel is an important food item, at least during the summer. Scats were collected at 12 locations in 1990-91, nine of which were within the Aleutian management subarea (Yunaska, Amlia, Gramp, Tag, Ulak, Amchitka, Kiska, Buldir, and Agattu). Of the 89 scats collected at the nine sites in 1990, 76 (85%) contained Atka mackerel remains. Data is only available from three of these nine sites in 1991; of the 67 scats collected from Ulak, Buldir and Agattu, 54 (81%) contained Atka mackerel remains. Other prey found in significant numbers in these collections include pollock, herring, and salmon.

Index counts of sea lions from Kenai Peninsula to Kiska Island in the AI declined 76% between 1975-1991 (Merrick et al. 1992). Declines over this 16-year period have been most severe in the central GOA and in the AI, the core of the species' range. Results of the 1992 survey suggest that the decline in sea lion numbers in the eastern AI (in the BS management area) and the western AI may have stopped, but may be continuing in the central AI (Table 2.11). Despite the apparent stabilization of numbers in portions of the AI, the population appears to have declined in the AI by about 80% since 1979, and may be continuing to decline in the central AI. NMFS and Alaska Department of Fish and Game (ADF&G) are currently conducting research on Steller sea lion feeding ecology (satellite telemetry and analysis of scat), the health and number of pups and juveniles (physiological analyses and pup counts) and seasonal distributions of sea lions and their prey (aerial and ship-board surveys of sea lions and fish) to better understand the causes of the decline and monitor the population during its anticipated recovery.

Steller sea lions were listed as threatened under the ESA on an emergency basis on April 5, 1990 (55 FR 12645), and on a final basis on November 26, 1990 (55 FR 49204). The listing included measures that: (1) established 3 nm buffer (=no-entry) zones around major Steller sea lion rookeries in the GOA and BSAI; (2) prohibited shooting at or near sea lions; and (3) reduced the allowable take incidental to commercial fisheries in Alaskan waters. A final Recovery Plan and proposals for designation of critical habitat for Steller sea lions will be released in early 1993.

For the 1992 BSAI groundfisheries, the Secretary implemented Amendment 20 to the BSAI FMP. Regulations have been implemented under the authority of these amendments that (1) geographically separate groundfish fishing from important sea lion foraging habitat, and (2) spread the fishing effort, both geographically and over time, preventing adverse effects that might result from intense fisheries in localized areas. The specific regulations implementing Amendment 20 prohibit trawling within 10 nm of 37 sea lion rookeries in the GOA and the BSAI. In addition (and including regulations

implemented in 1993), trawling is prohibited within 20 nm of four sea lion rookeries in the BS management subarea (Sea Lion rocks in Bristol Bay, and Akun, Akutan and Ugamak in the Krenitzin islands east of 170°W), and two rookeries in the AI management subarea (Seguam and Agligadak) during the pollock "A" season, which closes no later than April 15. These regulations create large contiguous areas in which trawling is prohibited during the pollock "A" season. Satellite telemetry data collected during winter 1992 in the Krenitzin islands indicated that the shallow nearshore portions of the shelf were used extensively for foraging, particularly by juveniles who tended to stay within 20 nm of land. The three-20 nm no-trawl zones around Akun, Akutan and Ugamak better encompass the winter distribution (on haul-outs) and protect juvenile foraging areas than the previous management regime. There is no similar satellite telemetry data for the Seguam Pass area for comparison but sea lion foraging behavior there may be similar.

Northern fur seals - The northern fur seal, distributed throughout the BS and north Pacific Ocean, is a pelagic species during most of the year and returns to land (primarily the Pribilof Islands in the eastern BS) to breed in summer. The diet of the northern fur seal in the GOA and the BS has been studied at least since the mid-1950s and has been summarized by Kajimura (1984) and Perez and Bigg (1986). In the BSAI, data exist for the months of June-October, and reveal a varied diet of small schooling fish and squid. Fur seals which had eaten Atka mackerel were collected in the western GOA and eastern BS near Unimak Pass and along the continental shelf to the Pribilof Islands. Atka mackerel comprised between 10-20 percent of the diet during late spring-early summer when fur seals traverse passes in the AI reentering the BS. Atka mackerel may also be important to fur seals when they leave the BS, primarily through passes in the eastern AI, in fall. The availability of Atka mackerel prey resources during spring and fall may be important to fur seals, particularly as pollock stocks in the Aleutian may be declining (B. Sinclair, pers. comm.; Wespestad and Dawson 1992).

The data for northern fur seals, although obtained primarily from females $\geq$ 3 years of age, suggests that they ingest smaller fish than Steller sea lions. Perez and Bigg (1986) reported that fur seals collected in the north Pacific Ocean ingested pollock ranging only from 4-40 cm ($n=1,721$ pollock from 71 stomachs) and Atka mackerel from 15-23 cm ($n > 5$ Atka mackerel from 5 stomachs). The largest fish consumed by northern fur seals in the collections of Perez and Bigg ($n > 3,000$ fish) was a 41 cm salmon. Pollock and Atka mackerel fisheries primarily catch fish (target species) larger than 30 and 35 cm, respectively (Hollowed et al. 1991; Lowe 1992; Wespestad and Dawson 1991). Consequently, the overlap between fisheries takes and the preferred fish sizes of northern fur seals is low, a conclusion also reached by Swartzmann and Haar (1983).

Northern fur seals are currently listed as depleted under the Marine Mammal Protection Act (MMPA). Current assessments suggest that the size of the population has been relatively stable since the early 1980s (Antonelis et al. 1990). The decline evidenced in the 1960s and early 1970s was associated with commercial and scientific harvests in the 1950s and early 1960s (Swartzman and Hofman 1991). Cause(s) of the decline observed in the late 1970s are largely unknown, but may be related to entanglement in marine debris and discarded fishing gear, incidental take, or reduced prey availability.

Pacific harbor seals - Harbor seals are found in all coastal areas of the GOA and are widely distributed in nearshore habitats of the BS (Pitcher 1980a; Calkins 1986; Frost and Lowry 1986). Individuals are occasionally observed as far as 100 km offshore (Pitcher 1980a). Only limited information is available on the diet of harbor seals in Alaska. Pitcher (1980a;b) reported that the harbor seal diet in the GOA was composed of at least 27 species of fish, as well as cephalopods (both octopi and squids) and shrimp in 269 stomachs analyzed. The seven principal prey were (in order of frequency of occurrence): pollock (21 percent), octopus (17 percent), capelin (9 percent), herring (6

percent), Pacific cod (6 percent), flatfishes (5 percent) and eulachon (5 percent). There were some significant regional differences in the harbor seal diet throughout the Gulf. Octopus, capelin, and cod were more important components of the diet in the Kodiak area, while pollock was the principal prey in the Prince William Sound area. Harbor seal food habits data from the BS (16 stomachs analyzed by Lowry et al. 1986 from animals collected in Bristol Bay) are much less extensive than for the Gulf. Herring and capelin were the principal components of the diet of harbor seals in Bristol Bay.

Little information is available on the size composition of fish in the diet of harbor seals compared with Steller sea lions and northern fur seals. What is available suggests that harbor seals consume smaller fish than Steller sea lions. Pitcher (1981) found that harbor seals collected from the same area and during the same period as Steller sea lions consumed smaller pollock (mean length of pollock ingested by harbor seals = 19.2 cm; for Steller sea lions, 29.8 cm). This suggests a low overlap in body size between pollock harvested by the fishery and those ingested by harbor seals.

In 1991, NMFS began a 3-year comprehensive population assessment of harbor seals in Alaska. During the first year, surveys were conducted in Bristol Bay, Prince William Sound and in the Copper River Delta. The number of seals in Bristol Bay appears to have remained relatively stable since the mid-1960s, at about 10,000 animals. In the Prince William Sound area, however, counts of harbor seals declined. During 1992, counts were made in the Kodiak Archipelago, the south side of the Alaskan Peninsula, and the Kenai Peninsula. These data indicated that the GOA harbor seal population had declined, possibly as much as 90%, a conclusion first reached by Pitcher (1989) after his surveys on Tugidak Island in the 1980s. In 1993, survey plans include southeastern Alaska and possibly the AI. At present, harbor seals are not listed under the ESA or designated as depleted under the MMPA. After completion of the assessment studies in 1993, NMFS will review harbor seal status in Alaska and consider changes to management as necessary.

Conclusions - The cetacean species discussed above interact with trawl fisheries either through a common prey such as pollock, cod, flatfish or Atka mackerel (Lowry et al. 1989) or by occasionally being caught in trawls, currently at the rate of several per year (NMFS unpublished data). The former would affect all species while the latter only the small to medium sized cetacean species.

Fish comprise varying proportions of the diet of large baleen whales, ranging from approximately 16% of the diet of fin whales, 29% of the diet of humpback whales, and 60% of the diet of minke whales (Perez and McAllister 1988). Fish ingested by the large baleen whales are almost exclusively small schooling fish, such as capelin, herring, and eulachon, or juveniles (not recruited to the fishery) of commercially exploited groundfish species, such as pollock, cod, and Atka mackerel. Atka mackerel has been found to be a food item of only one of the large baleen whales, the humpback whale, but its importance is not known. Based on these data, it can be concluded that direct competition between large baleen whales and Atka mackerel fisheries is probably low.

Since little is known of the seasonal distribution of beaked whales, or the extent of their reliance on commercially exploited fish stocks, the interactions between trawl fishing and beaked whales are difficult to determine. Perhaps at certain times of the year (spring and fall when entering and leaving the BS) and for certain portions of the population (such as females with calves) food availability in shallow waters of AI passes is important.

Fish generally comprise a greater proportion of the diet of the smaller cetaceans and pinnipeds, with over 50% being reported for the killer whale, harbor porpoise, and Dall's porpoise, and between 65-80% for the pinnipeds (Perez and McAllister 1988). These species are considered opportunistic and feed on a wide variety of fish species, including osmerids, clupeoids, gadids, salmonids, myctophids,

flatfish, sand lance, and Atka mackerel. Furthermore, although most of these species prefer fish smaller than those caught by commercial trawlers, many, particularly the Steller sea lion, will ingest larger individuals. Therefore, the potential for direct competition between pinnipeds and trawl fisheries is greater than for baleen whales. It was for this reason that annual and seasonal trawl exclusion areas were established around sea lion rookeries. While these were not intended as protection for other pinnipeds, the no-trawl zones prohibit trawling within areas where the vast majority of the harvest of Atka mackerel had previously occurred. It is not known how these management actions will affect fur seals (especially in spring and fall when they leave the BS) or harbor seals.

2.5 Pacific salmon listed under the Endangered Species Act

Five species of Pacific salmon occur off Alaska and might occur as incidental bycatch in groundfish fisheries: chinook salmon, Oncorhynchus tschawytscha; coho salmon, O. kisutch; sockeye salmon, O. nerka; chum salmon O. keta; and pink salmon O. gorbuscha. Of these species, several populations have been listed or are being considered for listing under the ESA. Snake River sockeye were listed as endangered (56 FR 58619, November 20, 1991), and Snake River spring/summer and fall chinook are listed as threatened (56 FR 29542, June 27, 1991; 57 FR 14653, April 22, 1992). A fourth species, winter-run chinook from the Sacramento River, was listed as threatened on November 5, 1990 (55 FR 46515), and are proposed for a change in status to endangered (57 FR 27416, June 19, 1992), but are almost unknown in Alaskan waters.

Although listed wild fish are not marked or directly identifiable, tagged hatchery fish from nearby locations have been used as indicators of the distribution of listed species. Coded wire tag (CWT) recovery data from observed groundfish fisheries suggests that the ocean distribution of these fish may extend into the BSAI, although their occurrence in that area would be extremely rare. Since 1981, no indicator CWT Sacramento River chinook or Snake River sockeye or chinook have been recovered in the BSAI groundfish fisheries.

2.6 Seabirds

Many seabirds occur in Alaskan waters and have the potential for interaction with groundfish fisheries in the AI. The most numerous seabirds in Alaska are northern fulmars, storm petrels, kittiwakes, murres, auklets, and puffins. These groups, and others, represent 38 species of seabirds that breed in Alaska. Eight species of Alaska seabirds breed only in Alaska and in Siberia. Populations of five other species are concentrated in Alaska but range throughout the North Pacific region. Marine waters off Alaska provide critical feeding grounds for these species as well as others that do not breed in Alaska but migrate to Alaska during summer, or that breed in Canada or Eurasia and overwinter in Alaska. Additional discussion about seabird life history, predator-prey relationships, and interactions with the groundfish fishery can be found in an EA prepared for the 1993 Groundfish Total Allowable Catch Specifications (NMFS 1993).

The following summarizes the status of seabirds currently listed, proposed to be listed, or which are candidates for listing, under the ESA:

Status	Category	Species
Listed	Endangered	Short-tailed albatross (Diomedea albatrus)
Proposed	Threatened (5/92)	Spectacled Eider (Somateria fischeri)
Candidate	Category 1	Steller's eider (Polysticta stelleri)
Candidate	Category 2	Marbeled murrelet (Brachyramphus marmoratus)
Candidate (1993)	Category 2	Red-legged kittiwake (Rissa brevirostris)
Candidate (1993)	Category 2	Kittlitz's murrelet (Brachyramphus brevirostris)

2.7 Possible Impacts on the Environment

2.7.1 Impacts on the Physical Environment

Under each alternative, physical impacts are those that would be caused by (1) trawl activity disturbing the seabed and associated benthic animals and plants, and (2) deposition of fish wastes from processing activities and discards. Disturbance of the benthos by trawls and fish wastes can alter the abundance and composition of the affected benthic community. The extent of change in the seafloor community and time to recovery will be directly influenced by the frequency and severity of disturbance events. Changes in the benthic community may affect food availability for bottom feeding species. Presently, the actual effects, if any, of trawling and fish waste disposal on the benthic environment of the AI are unknown.

Under Alternative 1, benthic disturbance by trawls and fish waste disposal is likely to be confined to a smaller portion of the AI, namely east of 180°W with the concentration of effort in the typical fishing grounds described in section 2.3.3. Thus, repeated disturbance may affect long-term changes in the composition and abundance of local benthic fauna and flora. Under Alternatives 2 and 3, a larger area would be affected but disturbance is likely to be less frequent at particular sites, potentially allowing more complete benthic recovery to occur. Presently, there is insufficient information available to predict the physical effects of these alternatives on the environment or any differences among them.

2.7.2 Impacts on the Biological Environment

2.7.2.1 Impact on the Atka Mackerel Resource

Under Alternative 1 (status quo), it is likely that the Atka mackerel fishery will continue to be prosecuted east of 180°W on the same fishing grounds described in Section 2.3.3. The fact that the same few locations have been repeatedly fished for at least the last 10 years, suggests that localized depletions on an annual basis or longer time scale have not occurred in these areas. The exploitation rates for Atka mackerel have been estimated to be quite low and under 2.5% in the last 10 years (Lowe 1992). These extremely low exploitation rates appear to be sustainable. It is unknown if the resource will be negatively affected as higher exploitation rates are implemented, but there is a greater risk of adverse impacts if the fishery continues to be prosecuted in the same manner on the same portion of the population. Atka mackerel are not a highly mobile species and data suggest that they are in fact quite localized; they would be more susceptible to potential localized depletion compared to more mobile fish species.

Under Alternative 2, there would be 2 districts within the AI (split at 177°E), and the BSAI Atka mackerel TAC could be apportioned between the districts. A likely apportionment would be according to the distribution of biomass from the latest most comprehensive AI survey conducted in 1991. Table 2.3 shows that in 1991, 55.5% of the Atka mackerel biomass was detected east of 177°E. If approximately 50% of the TAC is sufficient to support the current Atka mackerel fishery, there may not be a large change in the distribution of fishing effort. However, if 50% of the TAC is an insufficient amount to support the fishery in the usual locations, and/or the availability of a large amount of TAC west of 177°E is an incentive, fishing patterns may change and effort could be spread out along the AI. This could lessen the risk of localized depletion. Spreading out the effort and attempting to distribute the quota as the survey biomass is distributed, is more likely to be beneficial for the resource and reduce the possibility of adversely affecting the resource compared to Alternative 1.

If different fishing grounds are utilized (i.e., west of 180°W), there is the potential for the length composition of the catch to change. Section 2.1.2 discussed the geographic variability in length at age for Atka mackerel. Because the geographic differences have not remained constant over the years, it is difficult to anticipate the impacts on the length composition.

Alternative 3 would create three districts within the AI, thereby providing a mechanism to spatially allocate the Atka mackerel TAC among three districts. An apportionment could be made according to the distribution of biomass from the 1991 survey. This survey detected 10.8% of the Atka mackerel biomass in the eastern AI (170°-177°W), 44.7% in the central AI (177°W-177°E), and 44.5% in the western AI (177°-170°E) (Table 2.3).

The impacts under Alternative 3 are the same as those discussed under Alternative 2; however, the creation of three districts within the Aleutian subarea provides the greatest possibility of spreading out the Atka mackerel fishing effort to avoid spatially concentrated harvests. This alternative also provides the greatest potential to lessen the risk of localized depletion. Spreading out the effort and attempting to distribute the quota as the survey biomass is distributed, is more likely to be beneficial for the resource and reduce the possibility of adversely affecting the resource compared to Alternatives 1 and 2.

2.7.2.2 Impacts on Marine Mammals

The 10-mile annual and 20-mile seasonal trawl exclusion areas around Steller sea lion rookeries would be in place regardless of which Alternative is chosen. These create refuges where no trawling can occur in areas where, as recently as 1991, as much as 80% of the Atka mackerel had been harvested. It is not known to what extent these no-trawl areas protect foraging areas for pinnipeds other than Steller sea lions, particularly if the TAC for Atka mackerel is increased under Alternatives 2 and 3. Although intended as a protective measure for Steller sea lions, the no-trawl areas may decrease the interactions between trawl fisheries and other marine mammals, particularly northern fur seals, and harbor seals, which also utilize these areas, but this conclusion is uncertain.

Alternative 1 - The status quo does not allow for any spatial allocation of groundfish TACs within the AI. For Atka mackerel, only the fraction (27%, or 32,000 mt in 1993) of the entire ABC (117,100 mt in 1993) equivalent to the proportion of the biomass that is east of 180°W where the fishery is likely to concentrate, would be available in 1993. This alternative would not likely create localized depletions of Atka mackerel and thus, would probably not be detrimental to marine mammals. However, it would prevent the release of a large quantity (as much as 85,100 mt in 1993) of Atka mackerel to the fishery.

Alternative 2 - The creation of two districts in the AI subarea, 170°W-177°E and 177°-170°E, would distribute fishing effort if groundfish TACs were so apportioned. The alternative may not adequately protect the eastern Aleutian district, which has had the most fishing effort, particularly trawl effort for harvesting Atka mackerel. This is also the area in which Steller sea lions have continued to decline, while populations to the east and west may have recently stabilized or increased. The large eastern district created by this alternative had approximately 56% of the Atka mackerel biomass in the 1991 survey and would get this percentage of the Atka mackerel TAC. Based on past fishing patterns, most of this TAC would be removed from the Seguam Pass area, which is in a district (170°-177°W) that had only 11% of the Aleutian Atka mackerel biomass. This alternative is the least favorable to marine mammals since it would not adequately disperse effort for Atka mackerel in the eastern Aleutian district, possibly creating localized depletions of the species in areas through which many marine mammals pass on their way into and out of the BS and where Steller sea lions have continued to decline.

Alternative 3 - The creation of three districts in the AI subarea, 170°-177°W, 177°W-177°E, and 177°-170°E, would provide the most potential for disbursement of TACs and fishing effort of the three alternatives. For Atka mackerel, this would result in a distribution of trawl effort in proportion to the best information available about distribution of the species. The eastern area, which has approximately 11% of the Atka mackerel biomass (1991), has yielded between 56-68% of the harvest in the last 3 years. On the other hand, the western area has approximately 44% of the biomass (1991), but yielded 1% or less of the harvest since 1990. Therefore, Alternative 3 is preferred to Alternative 2 since it may decrease the likelihood of localized depletions of important marine mammal prey in areas through which many marine mammals pass on their way into and out of the BS and where Steller sea lions have continued to decline (in the two districts east of 177°E). However, the benefits to marine mammals, if any, of this alternative are uncertain, particularly since the increase in the TAC for Atka mackerel in 1993 and future years is unknown at this time.

2.7.2.3 Impacts on Pacific Salmon Listed under the Endangered Species Act

Sacramento River winter-run chinook salmon and Snake River sockeye salmon, fall chinook and spring/summer chinook salmon are listed as threatened or endangered under the ESA. An informal consultation pursuant to Section 7 of the ESA completed on February 20, 1992 for the FMP concluded that listed and proposed species of salmon are not likely to be adversely affected by groundfish fisheries conducted under the FMP. Consultation has been initiated for 1993 groundfish TACs, although for reasons below, this proposed amendment is expected to be beneficial in that it would decrease the possibility of salmonid mortality in BSAI groundfish fisheries.

Alternatives 2 and 3 of proposed Amendment 28 would create new management districts in the AI, facilitating future apportionment of TAC to the western AI. If TACs are so apportioned, some fishing effort would be displaced to the central and western AI from the eastern AI and perhaps from the Bering Sea. In particular, a potential 85,100 mt increase to the 1993 Atka mackerel TAC would be apportioned to the new Central and Western Districts. Information summarized in section 2.3.5 and table 2.8 illustrate that the overall bycatch rate of salmon, and by inference, of listed salmon, is lower in the western AI groundfish fisheries than in areas currently fished.

2.7.2.4 Impacts on Seabirds

The AI provides breeding and forage sites for a large number of piscivorous marine birds, including northern fulmars, storm petrels, kittiwakes, terns, murres, murrelets, auklets, puffins, albatrosses, cormorants, jaegers, gulls, and guillemots. Fishing interactions include direct effects of

entanglements or collisions with fishing gear, or through competition for fish prey; and indirect mortality from encounters with marine debris or pollution, and disruption of the ecosystem from habitat degradation. An assessment of impacts of groundfish fisheries on colonial and pelagic seabirds and migratory birds was prepared as part of the Final EA for 1993 Groundfish TAC Specifications for the BSAI and the GOA. The EA is incorporated by reference, as is the 1993 informal consultation with the U.S. Fish and Wildlife Service (USFWS) on the 1993 TAC specifications, and a 1989 biological opinion prepared by the USFWS on the effects of the Interim Incidental Take Exemption Program on seabird species listed as endangered or threatened under the ESA. These documents list the endangered, threatened, proposed and candidate species that may be found within the regions of the BSAI where the groundfish fisheries operate and the potential impacts of the groundfish fisheries on these species. The informal consultation on the 1993 TAC specifications concludes that (1) groundfish operations are likely to result in an unquantified level of mortality to short-tailed albatrosses, a listed species, (2) an anticipated annual incidental take of up to two individual birds will not jeopardize the existence of this species, and (3) the allowable incidental take does not constitute a "significant impact on the human environment" under NEPA.

Proposed Amendment 28 would create new management districts in the AI, allowing future apportionments of TAC within the AI. A potential long-range effect of such TAC allocation is a decreased fishing effort in the eastern AI and BS and an increased effort in the western AI. The relatively large size of the AI and difficulty of fishing in the western AI would likely result in fishing effort that produces negligible pollution and debris in the proposed districts, and that reduces those problems in the eastern AI. Additionally, because the sum of groundfish allocations is limited to 2 million mt, all of which is currently utilized, any increase in the TAC of one species of groundfish in the central and western AI would be balanced by reductions in apportionments to other areas, or in TACs for other species. For the 1993 Atka mackerel fishery, the current TAC of 32,000 mt has been completed, from the eastern AI. Because that amount exceeds the amount of fish available in the eastern AI if the AI is subdivided into three districts (the preferred alternative), any additional TAC (potentially 85,100 mt) would be made available only in the new Central and Western Districts, most likely in equal amounts.

While little is known of the details of the feeding ecology of many marine birds, most of those listed above eat squid and small forage fish (usually less than 20 cm in length), such as sandlance and juvenile capelin, herring, Pacific cod, and pollock. Small Atka mackerel (between 5-14 cm) were a large component of the food brought to chicks by puffins on Buldir Island in the western district in 1990-91, but were not observed there in 1988-89 (Byrd et al. 1992). Atka mackerel in this size range are considerably smaller than those caught by the commercial fishery (Figure 2.23) or even by survey trawls, and would likely be in waters too shallow for trawls to operate (Figure 2.6). Additionally, the Atka mackerel fishery is conducted with bottom trawl gear, which tends to capture larger fish than trawl towed nearer the surface. Furthermore, bycatch of other small forage fish and squid by the Atka mackerel fishery is very low (see section 2.3.5). Therefore, the potential for direct competition for prey between the Atka mackerel fishery and marine birds appears to be low in the AI. Furthermore, potential interactions between trawl vessels and some birds may be reduced by the 10 nm no-trawl zones around Steller sea lion rookeries, many of which are also nesting sites for marine birds (e.g., Agattu and Buldir Islands in the western district).

Since effects on prey availability for marine birds are probably small, the primary risk associated with trawl fishing is likely to be entanglement in gear, through encounters with discarded plastic debris, or from changes in the ecosystem brought about by degradation of habitat. Most entanglement with fishing gear is associated with gillnets and baited hooks on trolled or longline gear. It is estimated that between 96,000 and 250,000 marine birds were killed each year by the Japanese salmon drift

gillnet fishery, which operated in the vicinity of the western AI between 1952-88 (Byrd et al. 1992). Gillnets and troll gear are rarely used in groundfish fisheries, and trawl gear is much more predominant than is longline gear. Bottom trawls are much less likely to capture marine birds than are gillnets.

Even though rates of capture of marine birds in trawl gear are low, disbursement of fishing effort towards the western AI under Alternatives 2 and 3 is expected to increase the potential for capture of seabirds in the western AI, and decrease the potential in the eastern AI. Whether this would represent an overall increase in captures for the BSAI is not predictable. Any increase in availability of Atka mackerel should not significantly increase bird captures, because that fishery is prosecuted with bottom trawl gear. Furthermore, while the proposed amendment could ultimately result either in displacement of fishing effort to the western AI, or in a change to the proportion of allocated groundfish, it would not increase overall availability of groundfish TAC in the BSAI, for which the optimum yield of 2 million mt established by the FMP is currently fully utilized. Additionally, disbursement of fishing effort throughout the AI would be expected to reduce the accumulation of debris and pollution in areas that are at present subject to intense fishing effort. Sufficiently little is known about future groundfish allocations, or the habits and movements of many seabirds, that quantifying these changes and predicting the species affected is not possible at this time.

Given these considerations, the division of the AI into three management districts and potential increase in 1993 Atka mackerel TAC in the western AI are not expected to result in additional impacts on seabirds that have not already been considered in the aforementioned documents. This determination has been submitted to the USFWS for review and concurrence.

2.7.2.5 Impact on Bycatch of Prohibited Species, Other Allocated Groundfish and Forage Species

Prohibited Species: The data available suggest that bycatch rates for prohibited species have been highest in the 170°-177°W district and lowest in the 170°-177°E district. Shifting effort to the west under either Alternatives 2 or 3 could decrease prohibited species bycatch rates by the Atka mackerel fishery as a whole. However, this is dependent on the domestic fishery finding "clean" grounds similar to those used by the foreign fisheries in the 1970s.

Other Allocated Groundfish: As noted in Section 2.3.5, other allocated groundfish caught by Atka mackerel trawl vessels include Pacific cod, pollock, and rockfish (including Pacific ocean perch). The analysis below suggests that spatial allocation of the Atka mackerel TAC under Alternatives 2 or 3 could reduce the bycatch rates of Pacific cod and pollock. Alternative 3 could increase the bycatch rate of rockfish by the Atka mackerel fishery.

Anticipated impacts on prohibited species and allocated groundfish other than Atka mackerel are as follows:

<ins>Pacific cod</ins> - The potential bycatches of cod by the 1993 Atka mackerel fishery are shown below and will serve to illustrate the amounts of cod that could be caught as bycatch under each Alternative. These data suggest that shifting effort for Atka mackerel to the west under Alternatives 2 or 3 could decrease the cod bycatch rates of the Atka mackerel fishery as a whole relative to no spatial allocation. Furthermore, dividing the AI into three districts under Alternative 3 could decrease cod bycatch rates relative to Alternative 2.

Alternative 1: with the Atka mackerel TAC remaining at 32,000 mt and based on 1992 district Atka mackerel catch distribution and cod bycatch rates, little or no catch of Atka mackerel would occur west of 177°E:

District	Atka mackerel Catch (mt)	Pacific cod Bycatch Rate	Pacific cod Bycatch (mt)
Eastern	21,152	7.8%	1,650
Central	10,496	4.6%	483
Western	352	.3%	1
TOTAL	32,000	6.7%	2,134

Alternative 2: with the Atka mackerel TAC increased to 117,100 mt and based on the 1992 cod bycatch rate in the 170°W-177°E district and the mean rate from the 1977-88 foreign and JVP fisheries in the 177°-170°E district:

District	Atka mackerel Catch (mt)	Pacific cod Bycatch Rate	Pacific cod Bycatch (mt)
170°W-177°E	65,010	6.7%	4,356
177°-170°E	52,090	0.3%	156
TOTAL	117,100	3.9%	4,512

Alternative 3: (Council's preferred alternative) with the Atka mackerel TAC increased to 117,100 mt and based on the 1992 cod bycatch rates in the eastern and central districts and the mean rate from the 1977-88 foreign and JVP fisheries in the western district:

District	Atka mackerel Catch (mt)	Pacific cod Bycatch Rate	Pacific cod Bycatch (mt)
Eastern	12,670	7.8%	988
Central	52,340	4.6%	2,408
Western	52,090	0.3%	156
TOTAL	117,100	3.0%	3,552

Pollock - The potential bycatches of pollock by the 1993 Atka mackerel fishery are shown below and will serve to illustrate the amounts of pollock that could be caught as bycatch under each alternative. These data suggest that shifting effort for Atka mackerel to the west under Alternatives 2 or 3 could decrease the pollock bycatch rates of the Atka mackerel fishery as a whole relative to Alternative 1 (no spatial allocation).

Alternative 1: with the Atka mackerel TAC remaining at 32,000 mt and based on 1992 district Atka mackerel catch distribution and pollock bycatch rates; little or no catch west of 177°E:

District	Atka mackerel Catch (mt)	Pollock Bycatch Rate	Pollock Bycatch (mt)
Eastern	21,152	2.9%	613
Central	10,496	3.2%	336
Western	352	.5%	2
TOTAL	32,000	3.0%	951

Alternative 2: with the Atka mackerel TAC increased to 117,100 mt and based on 1992 pollock bycatch rate in the 170°W-177°E district and the mean rate from the 1977-88 foreign and JVP fisheries in the 177°-170°E district:

District	Atka mackerel Catch (mt)	Pollock Bycatch Rate	Pollock Bycatch (mt)
170°W-177°E	65,010	3.0%	1,950
177°-170°E	52,090	0.5%	260
TOTAL	117,100	1.9%	2,210

Alternative 3: with the Atka mackerel TAC increased to 117,100 mt and based on the 1992 pollock bycatch rates in the eastern and central districts and the mean rate from the 1977-88 foreign and JVP fisheries in the western district:

District	Atka mackerel Catch (mt)	Pollock Bycatch Rate	Pollock Bycatch (mt)
Eastern	12,670	2.9%	367
Central	52,340	3.2%	1,675
Western	52,090	0.5%	260
TOTAL	117,100	2.0%	2,302

Rockfish - The potential bycatches of all rockfish by the 1993 Atka mackerel fishery are shown below and will serve to illustrate the amounts of rockfish that could be caught as bycatch under each alternative. These data suggest that shifting effort for Atka mackerel to the westernmost district under Alternative 3 could increase the rockfish bycatch rates of the Atka mackerel fishery as a whole relative to Alternative 2 (two districts) or Alternative 1 (no spatial allocation).

Alternative 1: with the Atka mackerel TAC remaining at 32,000 mt and based on 1992 district Atka mackerel catch distribution and rockfish bycatch rates; little or no catch west of 177°E:

District	Atka mackerel Catch (mt)	Rockfish Bycatch Rate	Rockfish Bycatch (mt)
Eastern	21,152	3.5%	740
Central	10,496	8.8%	924
Western	352	4.2%	15
TOTAL	32,000	5.2%	1,679

Alternative 2, with Atka mackerel increased to 117,100 mt, and based on the 1992 rockfish bycatch rate in the 170°W-177°E district and the mean rate from the 1977-88 foreign and JVP fisheries in the 177°-170°E district.

District	Atka mackerel Catch (mt)	Rockfish Bycatch Rate	Rockfish Bycatch (mt)
170°W-177°E	65,010	5.2%	3,381
177°-170°E	52,090	4.2%	2,188
TOTAL	117,100	4.8%	5,569

Alternative 3, with Atka mackerel increased to 117,100 mt, and based on 1992 rockfish bycatch rates in the eastern and central districts and the mean rate from the 1977-88 foreign and JVP fisheries in the western district:

District	Atka mackerel Catch (mt)	Rockfish Bycatch Rate	Rockfish Bycatch (mt)
Eastern	12,670	3.5%	443
Central	52,340	8.8%	4,606
Western	52,090	4.2%	2,188
TOTAL	117,100	6.2%	7,237

Forage Species: The little data available on bycatch of forage species (other than Atka mackerel itself) by the Atka mackerel fishery suggests that spatially allocating the Aleutian Atka mackerel TAC under Alternatives 2 or 3 could increase the bycatch rates of squid and decrease the bycatch rates of octopus. However, bycatch rates of both cephalopod groups by this fishery are quite low (1991 and 1992 annual rates of both were less than 0.1 kg/mt Atka mackerel caught) and the fishery should not significantly affect their availability to marine mammals or seabirds.

Table 2.1 Length and weight-at-age for Atka mackerel sampled in six areas (Figure 2.1) of the AI region.

Area	Age (yr)	No. (len)	Length (cm)	No. (wt)	Weight (kg)	Area	Age (yr)	No. (len)	Length (cm)	No. (wt)	Weight (kg)
1	2	5	25.8	3	.257	4	2	8	26.5	8	.246
1	3	83	29.2	71	.287	4	3	35	31.8	31	.429
1	4	112	30.3	48	.311	4	4	41	33.6	21	.472
1	5	104	32.1	43	.374	4	5	77	35.3	11	.541
1	6	76	34.1	20	.415	4	6	20	36.5	7	.604
1	7	29	33.9	17	.391	4	7	4	37.8	4	.617
1	8	27	34.8	4	.428	4	8	3	38.0	3	.698
1	9	5	36.2	2	.512	4	9	1	35.0	1	.418
1	10	7	35.1	0	.000	4	10	1	37.0	1	.567
						5	2	28	24.3	28	.156
2	3	28	31.9	0	.000	5	3	82	29.4	57	.282
2	4	77	33.8	8	.496	5	4	55	33.5	33	.457
2	5	152	35.3	20	.604	5	5	51	35.4	36	.568
2	6	80	35.5	13	.565	5	6	70	36.6	32	.582
2	7	42	36.6	28	.621	5	7	34	36.5	18	.613
2	8	28	36.5	16	.580	5	8	13	37.6	6	.630
2	9	6	37.7	1	.650	5	9	8	38.0	6	.637
2	11	1	40.2	0	.000	5	10	4	41.5	1	1.010
3	2	20	27.4	20	.257						
3	3	69	30.6	68	.349	6	3	20	33.1	2	.540
3	4	108	34.8	21	.453	6	4	51	36.4	14	.819
3	5	155	36.3	13	.556	6	5	83	38.8	9	.926
3	6	62	37.2	5	.690	6	6	116	39.5	23	.967
3	7	38	38.4	18	.669	6	7	44	40.4	15	.968
3	8	20	38.3	9	.632	6	8	86	41.4	36	.946
3	9	5	39.6	2	.690	6	9	47	42.6	31	.991
3	10	1	43.0	1	.940	6	10	14	42.4	11	.983
						6	11	4	43.5	3	1.017
						All	2	61	25.7	59	.208
						Areas	3	317	30.3	229	.326
							4	444	33.4	145	.447
							5	622	35.5	132	.531
							6	424	36.8	100	.642
							7	191	37.5	100	.641
							8	177	38.9	74	.765
							9	72	41.0	43	.884
							10	27	40.2	14	.952
							11	5	42.8	3	1.017

Data are from survey samples taken from 1980 to 1986. (Area 1 = Stalemate Bank, 2 = Buldir and Tahoma Reefs, 3 = Kiska Island, 4 = Amchitka Island, 5 = Petrel Spur, 6 = Seguam Pass)

Table 2.2 Atka mackerel biomass estimates (mt) in each area, subarea and depth strata sampled in bottom trawl surveys of the AI conducted in 1980, 1983, 1986 and 1991. See Figure 2.4 for location of areas and subareas. - indicates no successful sampling in strata.

Area	Subarea	Depth	1980	1983	1986	1991
1	1	1-100 m	96	178	1550	4549
		100-200	20463	93245	12721	79219
		200-300	61	1957	173	11
		300-500	25	148	0	0
		500-900	11	0	0	-
		TOTAL	20656	95528	14444	83779
	2	1-100 m	-	15144	-	87270
		100-200	10638	23712	33342	79717
		200-300	244	130	0	18
		300-500	6	0	0	0
		500-900	0	0	0	-
		TOTAL	10888	38986	33342	167005
	3	1-100 m	-	-	480997	118411
		100-200	45544	855	14657	42985
		200-300	326	1	22	4
		300-500	0	0	14	0
		500-900	0	1	0	-
		TOTAL	45870	857	495690	161400
2	1	1-100 m	-	-	-	19452
		100-200	0	15	1	51303
		200-300	0	166	3	83
		300-500	-	0	0	0
		500-900	-	0	0	-
		TOTAL	0	181	4	70838
	2	1-100 m	-	-	0	6
		100-200	1868	667	4	3
		200-300	3	2	0	0
		300-500	0	0	0	0
		500-900	0	0	0	-
		TOTAL	1871	669	4	9
	3	1-100 m	-	65814	33	67624
		100-200	1175	60008	7043	3679
		200-300	73	26	2	0
		300-500	16	0	0	0
		500-900	0	0	0	-
		TOTAL	1264	125848	7078	71303

Table 2.2 (continued).

Area	Subarea	Depth	1980	1983	1986	1991
3	1	1-100 m	-	13482	52	8226
		100-200	-	4105	50	46943
		200-300	1463	27	1	134
		300-500	182	0	0	-
		500-900	-	-	-	-
		TOTAL	1645	17614	103	55303
	2	1-100 m	0	27593	42732	28816
		100-200	382	6	177	3533
		200-300	2	0	0	14
		300-500	0	0	0	0
		500-900	4	0	0	-
		TOTAL	388	27599	42909	32363
4	1	1-100 m	0	22121	-	14760
		100-200	375	131	6644	28253
		200-300	363	2	16	0
		300-500	0	0	1	0
		500-900	0	0	0	-
		TOTAL	738	22254	6661	43013
	2	1-100 m	94	0	0	0
		100-200	5	0	1	5
		200-300	0	0	0	0
		300-500	0	0	-	0
		500-900	-	0	0	-
		TOTAL	99	0	1	5
	3	1-100 m	0	-	1	32
		100-200	46314	13317	33546	2923
		200-300	486	449	179	177
		300-500	290	0	0	0
		500-900	0	0	43	-
		TOTAL	47090	13766	33726	3132
1	ALL	ALL	77414	135371	543476	412184
2	ALL	ALL	3135	126698	7086	142150
3	ALL	ALL	2033	45213	43012	87666
4	ALL	ALL	47927	36020	40431	46150
ALL	ALL	ALL	130509	343302	634005	688150

Table 2.3 Percent distribution of Atka mackerel biomass in the AI based on bottom trawl surveys conducted in 1980, 1983, 1986 and 1991. Longitudinal zones include areas both north and south of the island chain. 177/8°E refers to the western border of the easternmost survey subareas in areas 1 and 3. In area 1, the western border of subarea 3 is at 177°E, while north of the island chain in area 3, the western border is at 178°E.

Longitudinal Zones	1980	1983	1986	1991
170°-174°W	37.05	40.67	6.44	10.82
174°-177°W	1.51	0.19	0.00	0.00
177°-180°W	0.57	6.54	1.05	16.54
180°-177/8°E	35.44	8.29	84.95	28.16
177/8°-170°E	25.43	44.31	7.55	44.48
170°-177°W	38.56	40.86	6.44	10.82
177°W-177/8°E	36.01	14.82	86.00	44.70
177/8°-170°E	25.43	44.31	7.55	44.48

Table 2.4 BSAI Target Fishery Definitions Based on Species Composition of Individual Hauls. Definitions are mutually exclusive and hauls are assigned to each fishery in the following hierarchy:

Target Fishery	Definition
1. Pelagic pollock	Pollock ≥ 95% of total groundfish
2. Greenland turbot	Greenland turbot ≥ 35% of retained groundfish
3. Pacific cod	Pacific cod ≥ 40% of retained groundfish
4. Flatfish	Flatfish ≥ 40% of retained groundfish
5. Bottom pollock	Pollock ≥ 20% of retained groundfish
6. Rockfish	Rockfish ≥ 35% of retained groundfish
7. Sablefish	Sablefish ≥ 20% of retained groundfish
8. Atka mackerel	Atka mackerel ≥ 20% of retained groundfish
9. Arrowtooth flounder	Arrowtooth fl. ≥ 20% of retained groundfish
10. Other	All that do not satisfy any of above

Table 2.5 Observed foreign, joint-venture and domestic Atka mackerel catch distribution (percent of annual total) by subarea in the Aleutian Islands 170°W - 170°E. Observed total (mt) is total observed directed Atka mackerel catch in AI district, not total landed catch.

	Foreign				JV				Domestic			
Year	170°-177°W	177°W-177°E	177°-170°E	Observed Total	170°-177°W	177°W-177°E	177°-170°E	Observed Total	170°-177°W	177°W-177°E	177°-170°E	Observed Total
1977	10.3	6.6	83.0	1,241								
1978	6.2	36.7	57.1	1,855								
1979	87.0	0.1	12.9	2,102								
1980	98.1	<0.1	1.9	336								
1981	100.0	<0.1	0	1,082								
1982	99.9	0	0.1	1,307	100.0	0	0	4,862				
1983	100.0	0	0	105	100.0	0	0	4,558				
1984	100.0	0	0	15	80.1	19.9	0	26,618				
1985					52.9	46.9	0.2	19,503				
1986					67.3	32.7	0	13,165				
1987					26.8	73.2	0	13,735				
1988					0.4	99.6	0	11,522				
1989												
1990									55.7	43.9	0.4	11,877
1991									68.5	31.5	0	15,938
1992									66.1	32.8	1.1	27,040

Table 2.6 Estimated catches (mt) and percent of annual catch of Atka mackerel caught within 10 and 20 nm of Steller sea lion rookeries in the BSAI.

Year	-- 10 nm -- Percent	mt	-- 20 nm -- Percent	mt	BSAI Annual Catch
1982	69.1	13,733	91.0	18,085	19,874
1983	76.1	8,923	98.1	11,503	11,726
1984	78.6	28,339	88.0	31,728	36,055
1985	76.6	29,001	83.0	31,424	37,860
1986	81.0	25,912	84.8	27,128	31,990
1987	45.2	13,588	49.7	14,940	30,061
1988	45.1	9,960	46.4	10,247	22,084
1990	73.3	16,276	90.0	19,984	22,205
1991	83.3	20,555	92.6	22,850	24,676
1992	0.0	0	16.7	7,720	46,226

Table 2.7 Quarterly distribution of Atka mackerel harvest in the AI by foreign/JVP (1982-88) and domestic (1990-92) fisheries.

	Percent Caught in Quarter:			
Year	1	2	3	4
1982	2.3	51.5	37.2	9.0
1983	0.1	46.9	53.0	0.0
1984	0.1	55.4	44.4	0.1
1985	0.0	81.2	18.7	0.1
1986	0.0	62.4	37.5	0.1
1987	0.0	54.7	33.2	12.1
1988	0.0	54.1	45.8	0.1
1990	2.0	93.8	1.6	2.5
1991	97.4	2.6	0.0	0.0
1992	63.1	36.7	0.2	---

Table 2.8 Bycatch rates of prohibited species, other allocated groundfish species and forage species for marine mammals and seabirds by foreign and JVP (mean rates by subarea from 1977-88) and domestic (annual rates by subarea from 1990-92) Atka mackerel fisheries in the AI (INPFC district 54). King crab and salmon are listed in number per mt of Atka mackerel caught; all others as kg (prohibited and forage) or mt per mt (groundfish).

I. Foreign and Joint Venture Fisheries, 1977-88

	Subarea		
Bycatch Species	170°-177°W	177°W-177°E	177°-170°E
Prohibited Species			
Halibut	2.751	1.677	0.068
King crab	0.043	0.007	0.017
Salmon (1982-88)	0.009	<0.001	0.001
Allocated Groundfish			
Pollock	0.079	0.014	0.005
Pacific cod	0.138	0.113	0.003
Pacific ocean perch	0.005	0.004	0.022
All rockfish	0.008	0.021	0.042
Forage Species			
Squid	0.104	0.042	0.517
Octopus	0.076	0.005	0.001

II. Domestic Fisheries, 1990-92

		Subarea		
Bycatch Species		170°-177°W	177°W-177°E	177°-170°E
Prohibited Species				
Halibut	1990	3.301	2.306	
	1991	0.892	3.176	
	1992	1.618	0.539	
King Crab	1990	0.004	0.021	
	1991	0.004	0.092	
	1992	0.472	0.000	
Salmon	1990	0.031	0.005	
	1991	0.002	0.010	
	1992	0.001	0.000	

Table 2.8 (continued).

II. Domestic Fisheries, 1990-92

Bycatch Species		Subarea 170°-177°W	Subarea 177°W-177°E	Subarea 177°-170°E
Allocated Groundfish				
Pollock	1990	0.029	0.032	
	1991	0.007	0.033	
	1992	<0.001	0.009	
Pacific cod	1990	0.113	0.144	
	1991	0.060	0.084	
	1992	0.078	0.046	
POP	1990	0.009	0.010	
	1991	0.016	0.007	
	1992	0.020	0.016	
All Rockfish	1990	0.025	0.038	
	1991	0.028	0.011	
	1992	0.035	0.088	
Forage Species				
Squid	1990	0.261	0.078	
	1991	0.000	0.000	
	1992	0.006	0.009	
Octopus	1990	0.050	0.024	
	1991	0.101	0.028	
	1992	0.006	0.009	

Table 2.9 Halibut bycatch rates (kg halibut/mt of groundfish) by bottom trawl fisheries for Atka mackerel, pollock, rockfish and Pacific cod in the BSAI in 1991. Data collected by fishery observers.

Fishery	Mean	Median
Atka mackerel	4.38	0.87
Pollock	23.23	11.67
Rockfish	19.03	9.90
Pacific cod	20.92	18.02

Table 2.10 North Pacific Fisheries Management Council's recommendations for 1993 Vessel Incentive Program Bycatch rate standards for BSAI fisheries. Bycatch rates are listed as kg (halibut) or number (crabs) per mt of groundfish.

Fishery	Halibut	King Crab
Midwater Pollock	1.0	--
Bottom Pollock	7.5 (1st quarter) 5.0 (2nd quarter)	--
Yellowfin sole	5.0	2.5
Other trawl	30.0	2.5

Table 2.11. Counts of adult and juvenile Steller sea lions at trend rookeries haulouts in the Aleutian Islands during June and July aerial surveys from 1975-1991. The eastern Aleutian area is in the BS fisheries management district, while the central and western Aleutian areas are in the Aleutian Island management district. The central area in this table is equivalent to the eastern (170°-177°W) and central (177°W-177°E) subareas proposed in Alternatives 2 and 3 of this analysis. The western area in this table is equivalent to the western subarea (177°-170°E) proposed in Alternative 3 of this analysis.

	----------Aleutian Islands----------		
Year	Eastern	Central	Western
1975	19,769		
1976	19,743		
1977	19,195		
1979		36,632	14,011
1985	7,505	23,042	
1989	3,032	7,572	2,738
1990	3,801	7,988	2,327
1991	4,231	7,499	2,411
1992	4,839	6,396	2,868
Overall Change - 76%		- 83%	- 80%

List of Rookeries

----------Aleutian Islands----------		
Eastern	Central	Western
Adugak	Kiska-2	Attu
Ogchul	Ayugadak	Agattu
Bogoslof	Amchitka-2	Buldir
Akutan	Semisopochnoi-2	
Akun	Ulak	
Ugamak	Tag	
Sea Lion Rks	Gramp Rk	
	Adak	
	Kasatochi	
	Agligadak	
	Seguam	
	Yunaska	

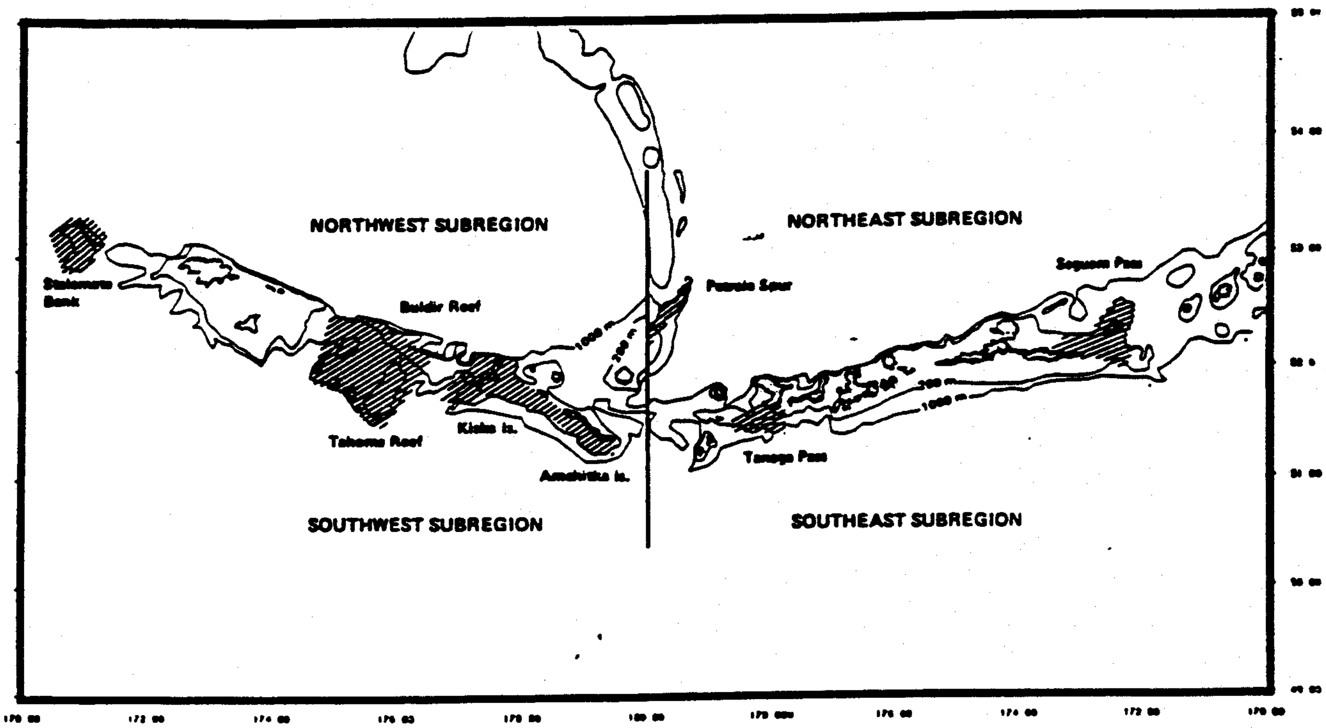


Figure 2.1 Map of the Aleutian Islands region showing major concentrations of Atka mackerel found in surveys.

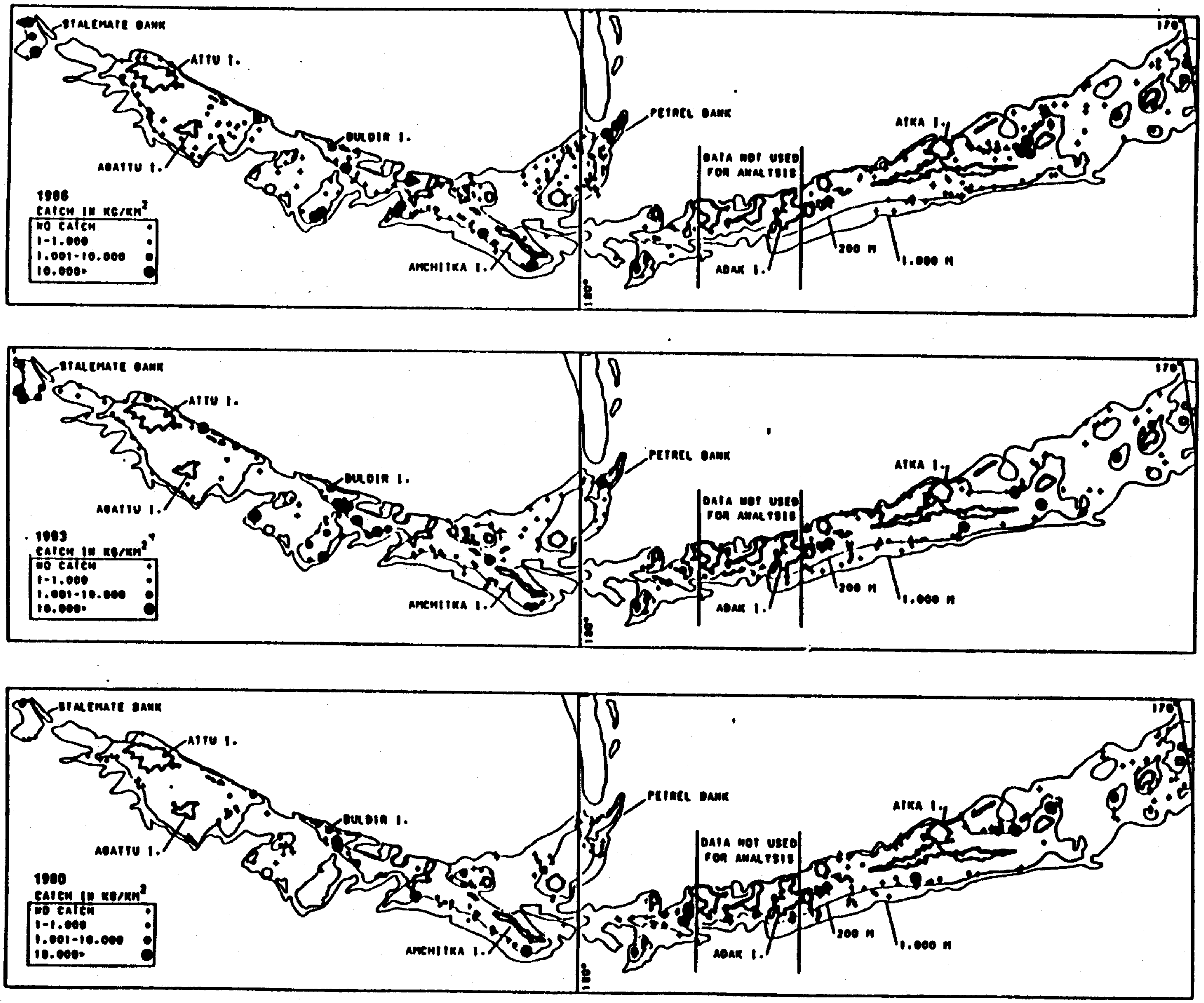


Figure 2.2 Distribution and relative abundance of Atka mackerel in the Aleutian Island based on 1980, 1983 and 1986 bottom trawl surveys.

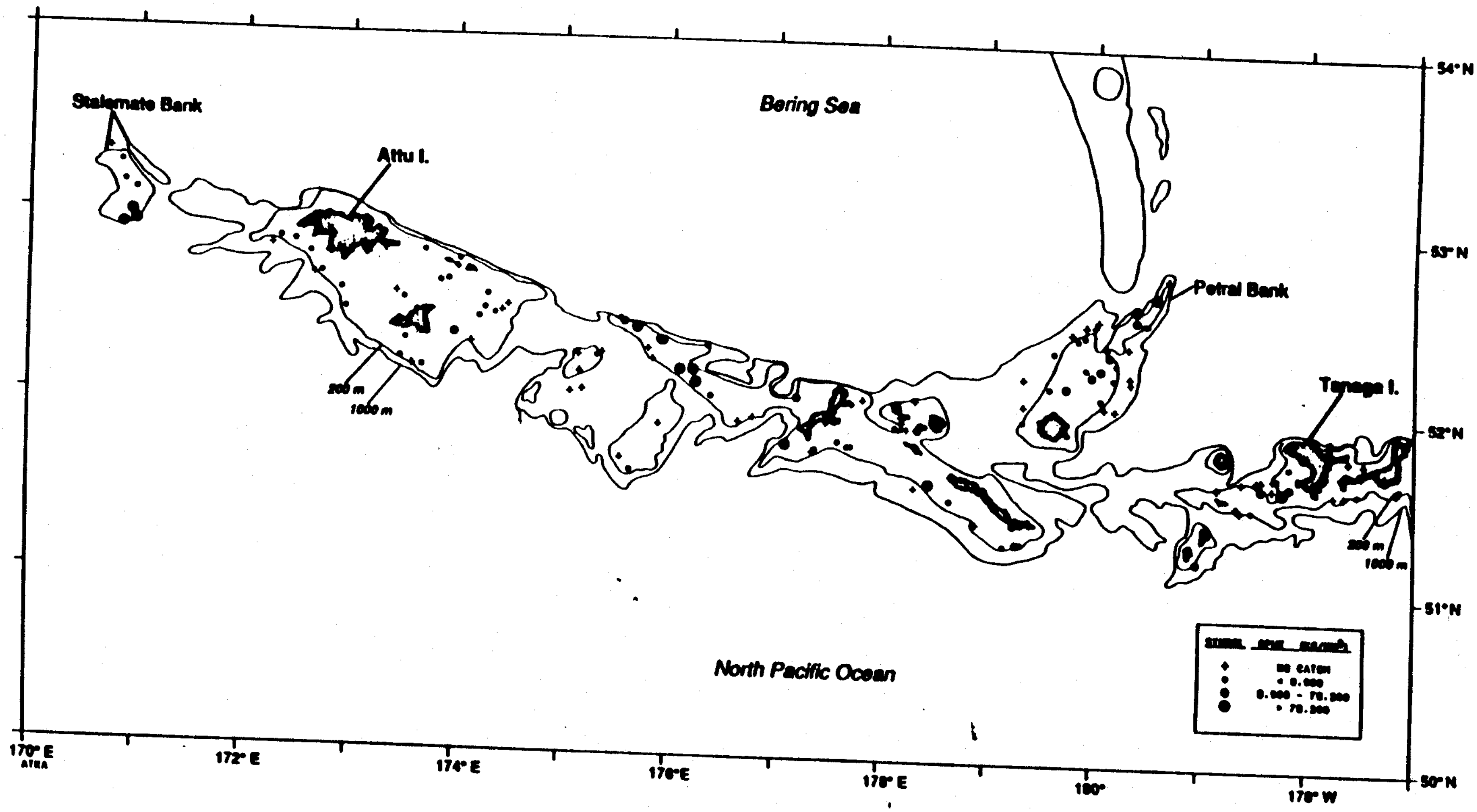


Figure 2.3 (continued).

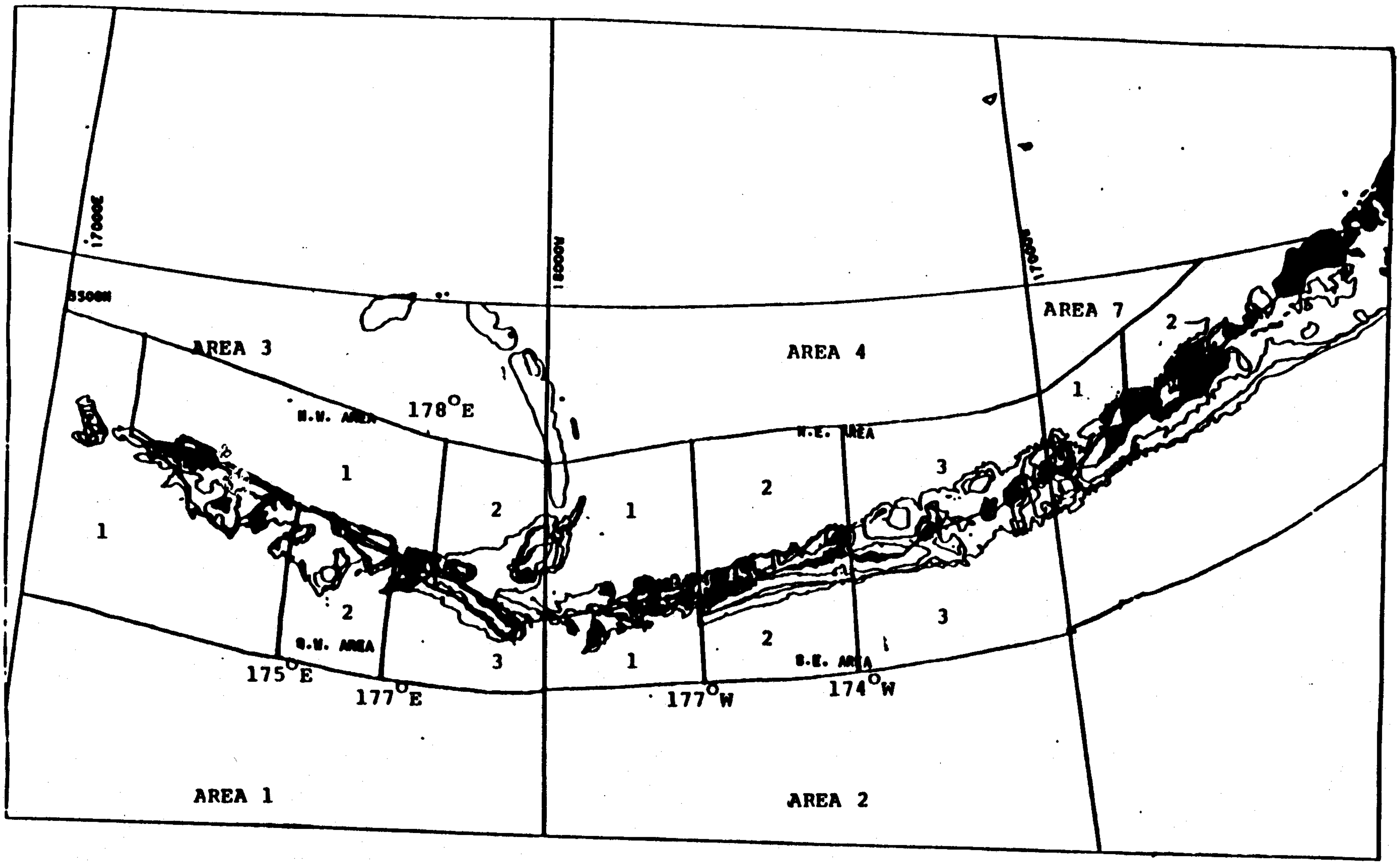


Figure 2.4 Area (1-4) and subarea strata used for biomass estimations in the 1980, 1983, 1986 and 1991 bottom trawl surveys of the Aleutian Islands. Only the area from 170°W to 170°E is discussed in this assessment.

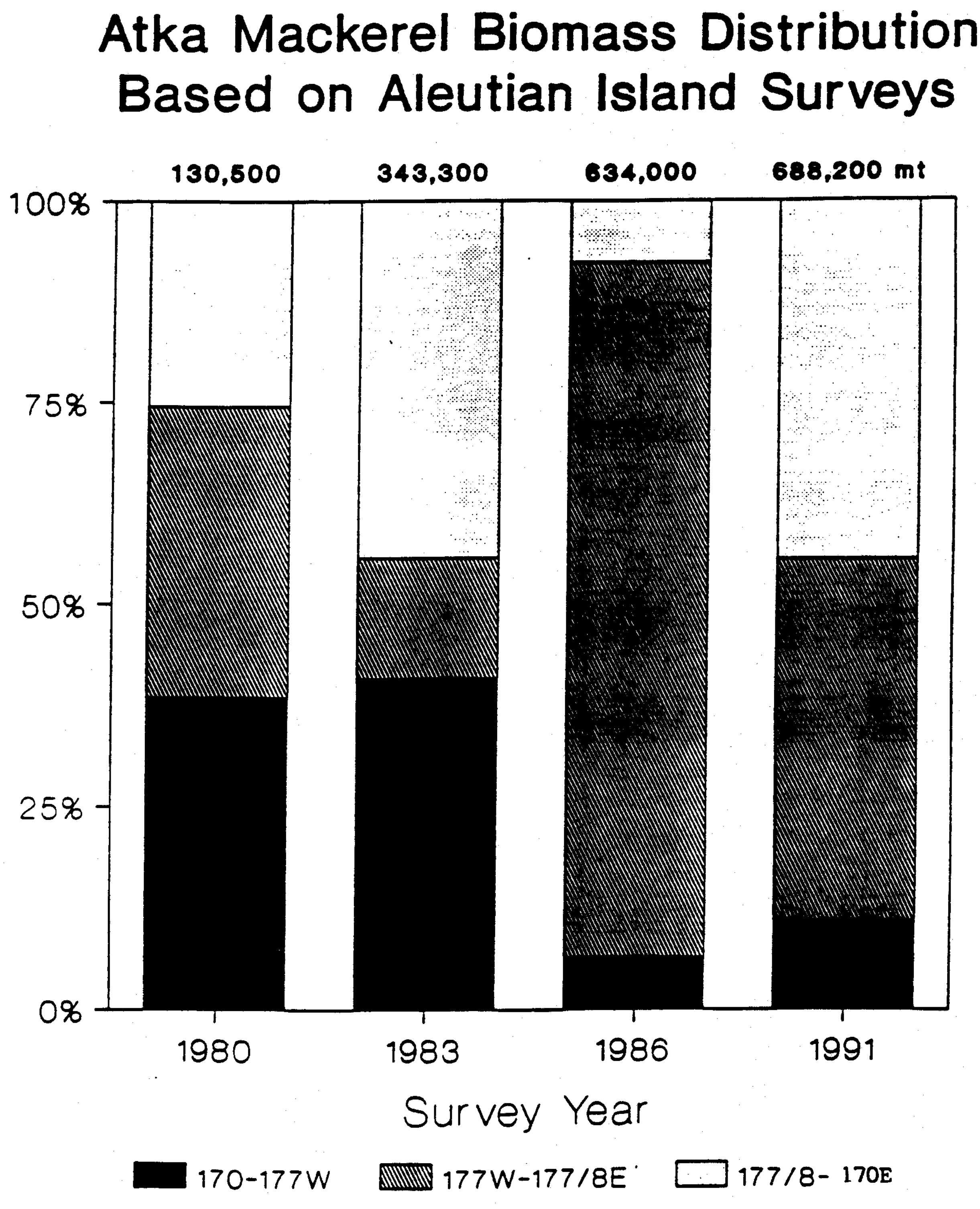
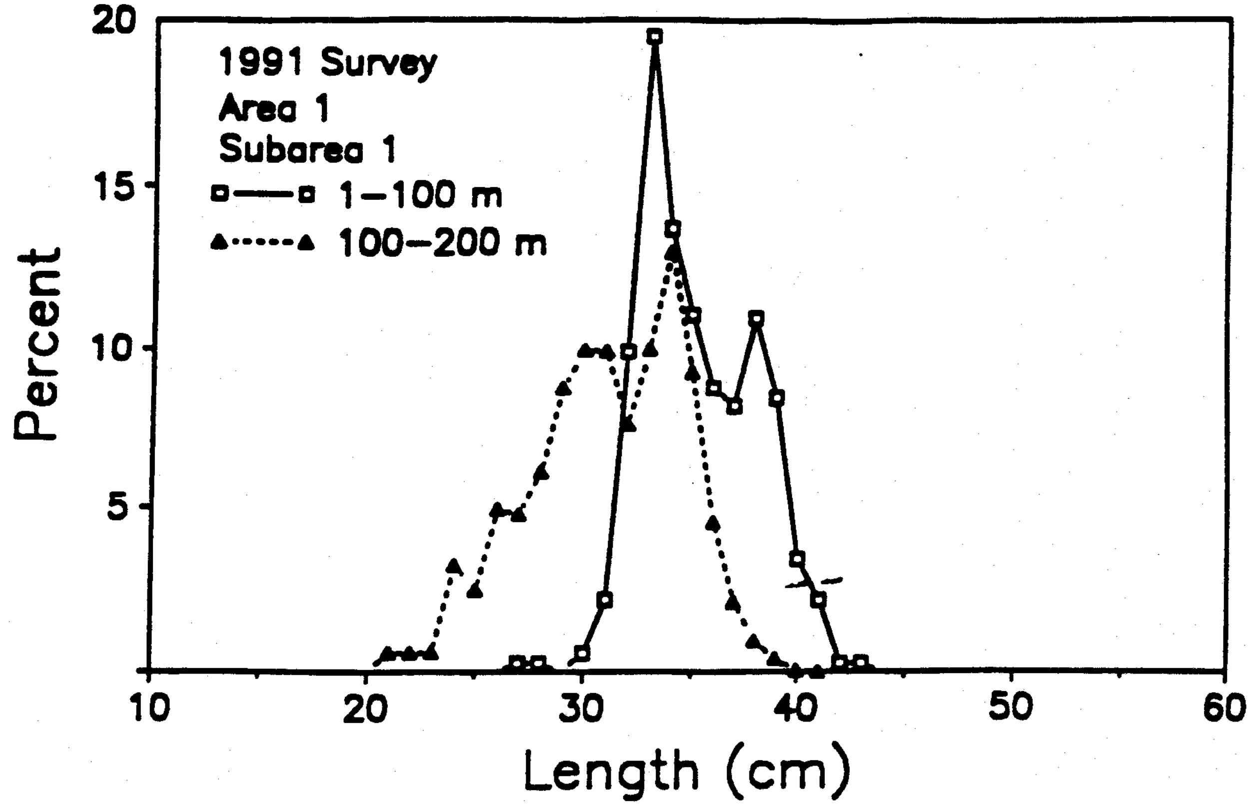


Figure 2.5 **Atka mackerel biomass distribution (percent by subarea) based on 1980, 1983, 1986 and 1991 Aleutian Island bottom trawl surveys.**



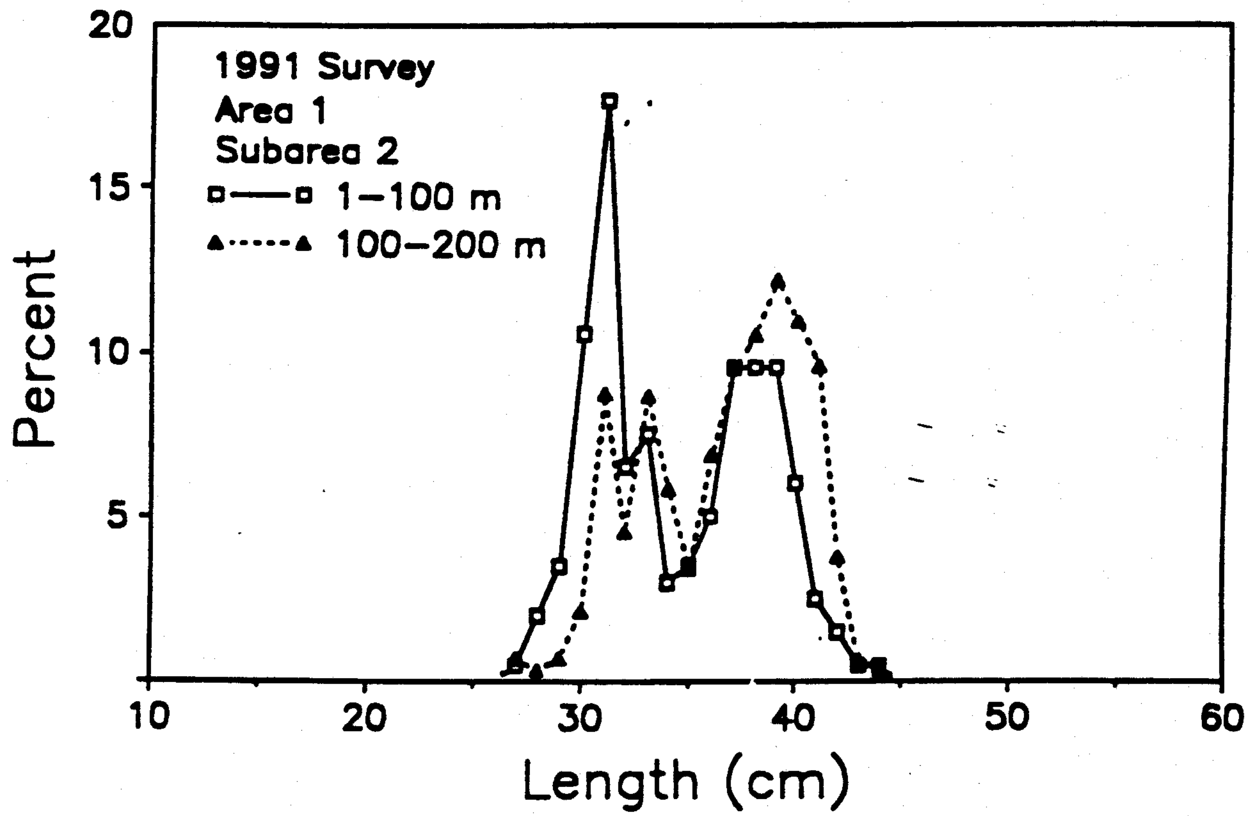


Figure 2.6 Length-frequencies of estimated Atka mackerel population in each area, subarea and depth strata of the 1991 Aleutian Island bottom trawl survey.

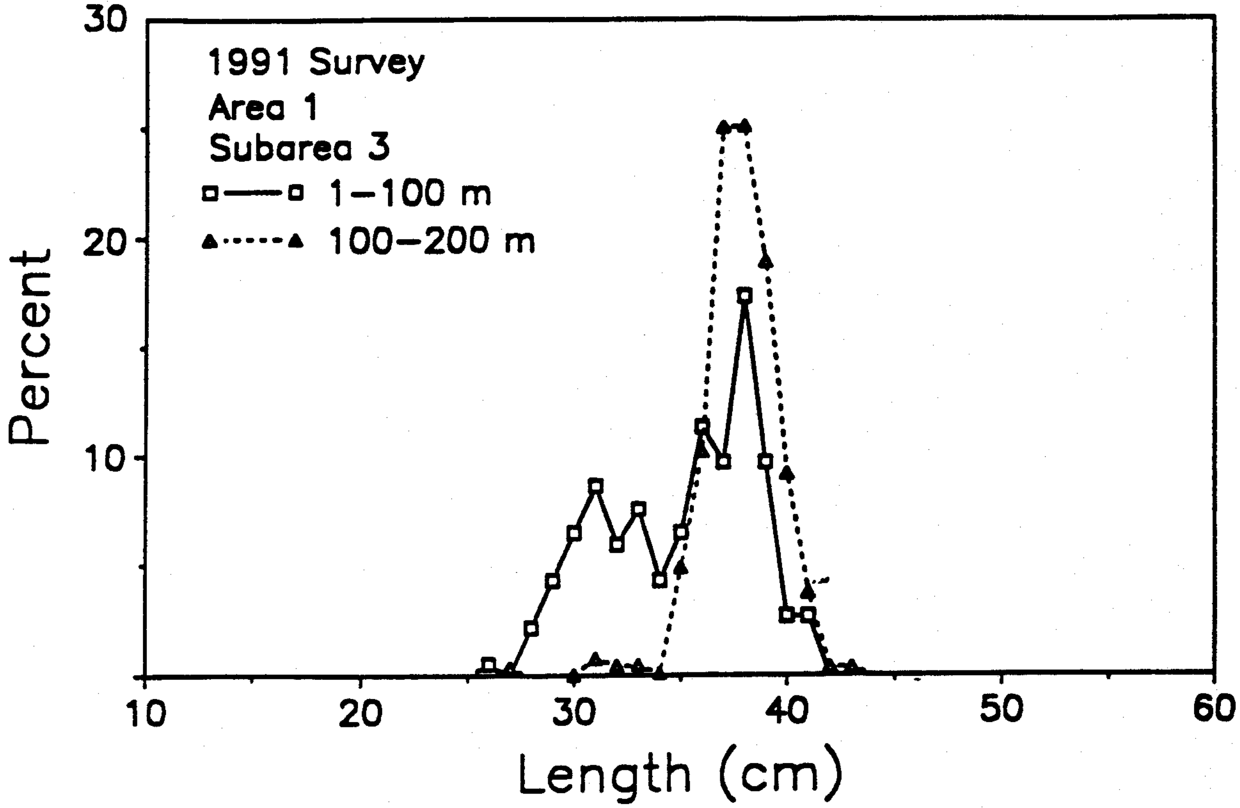
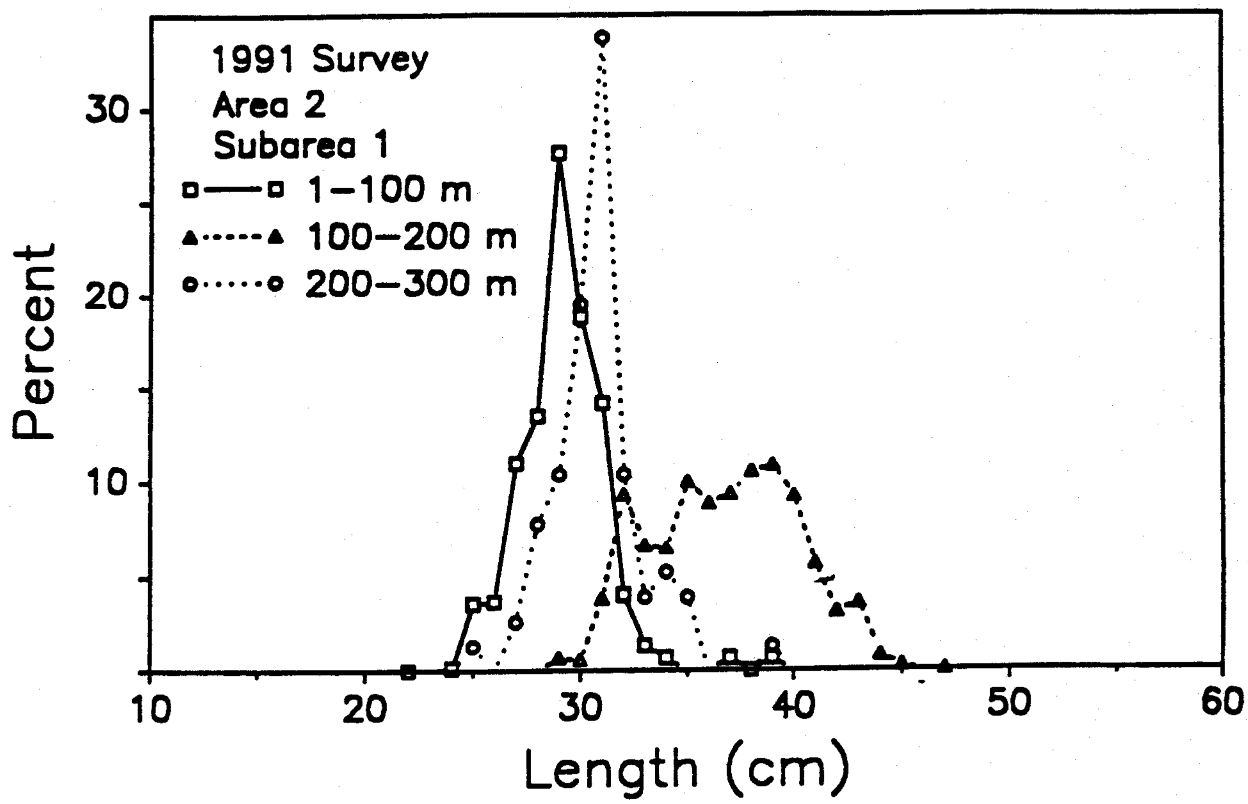
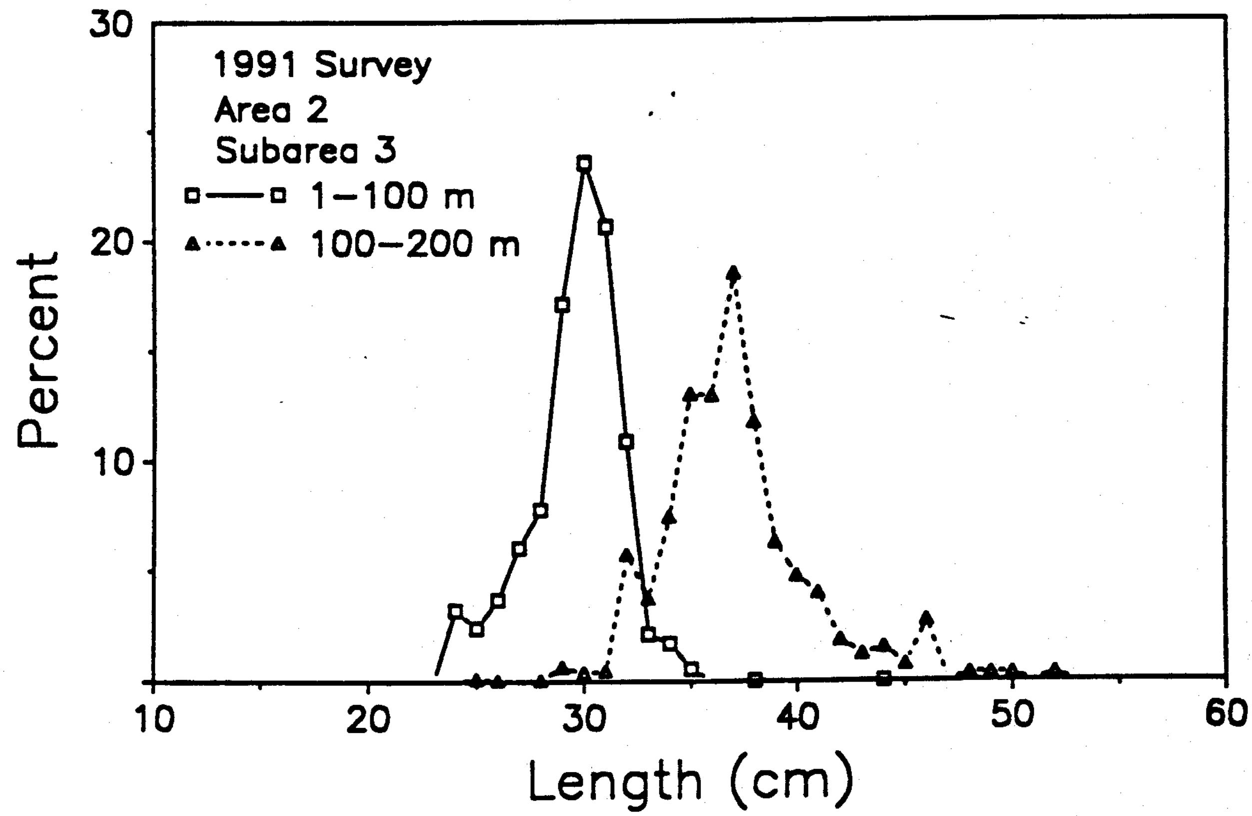


Figure 2.6 (continued)





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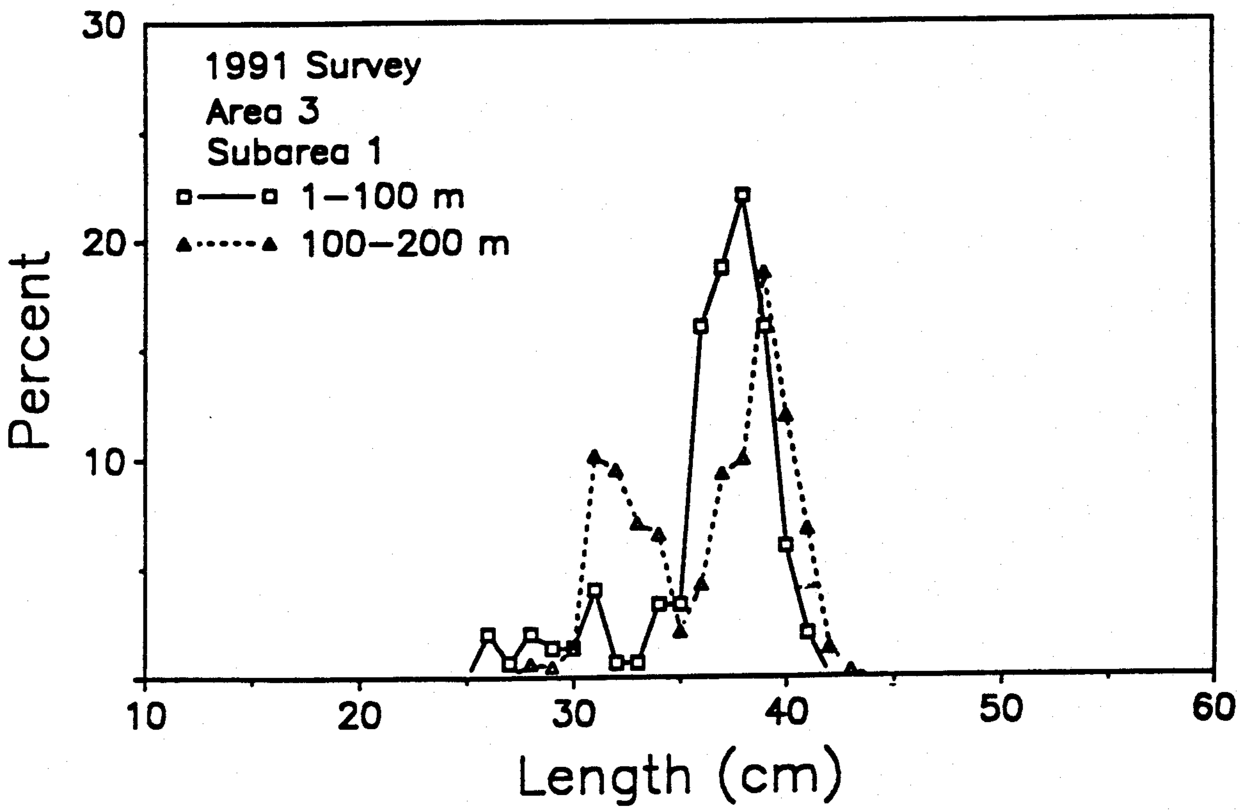


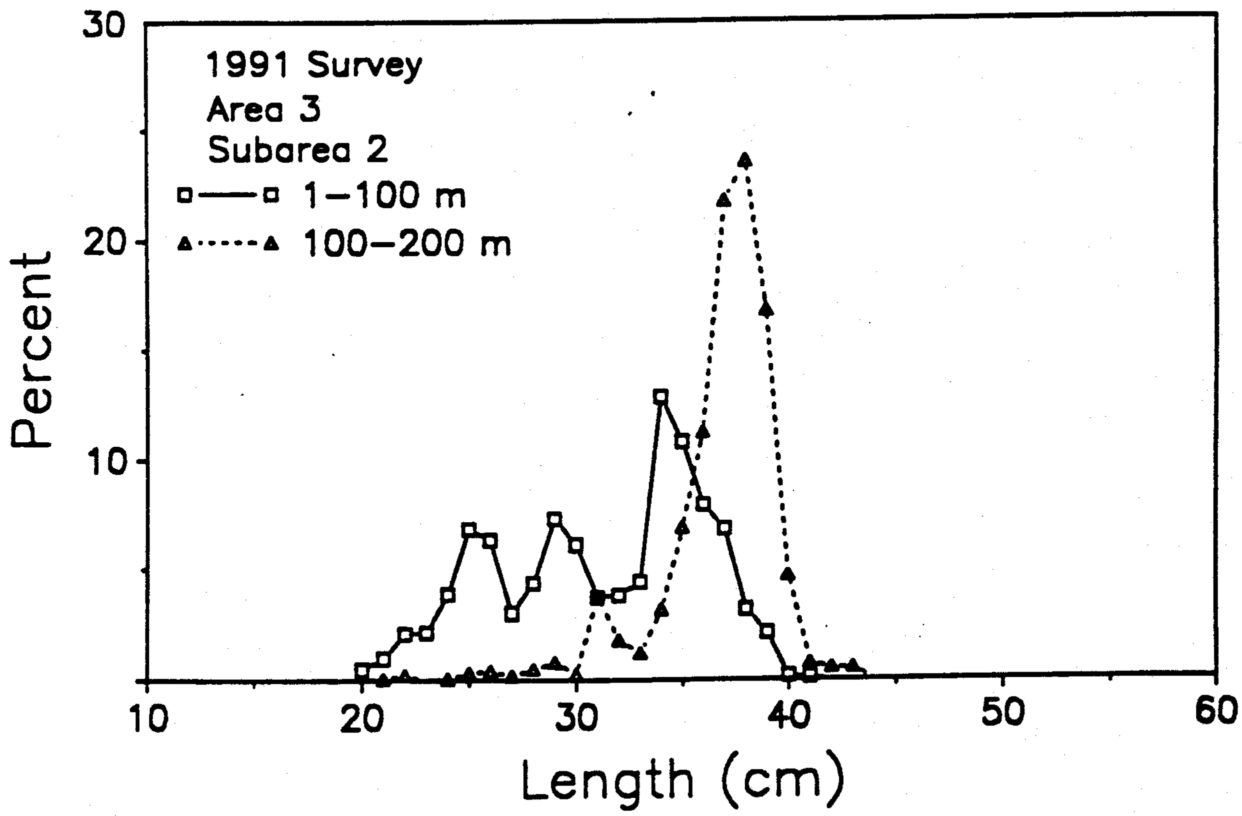
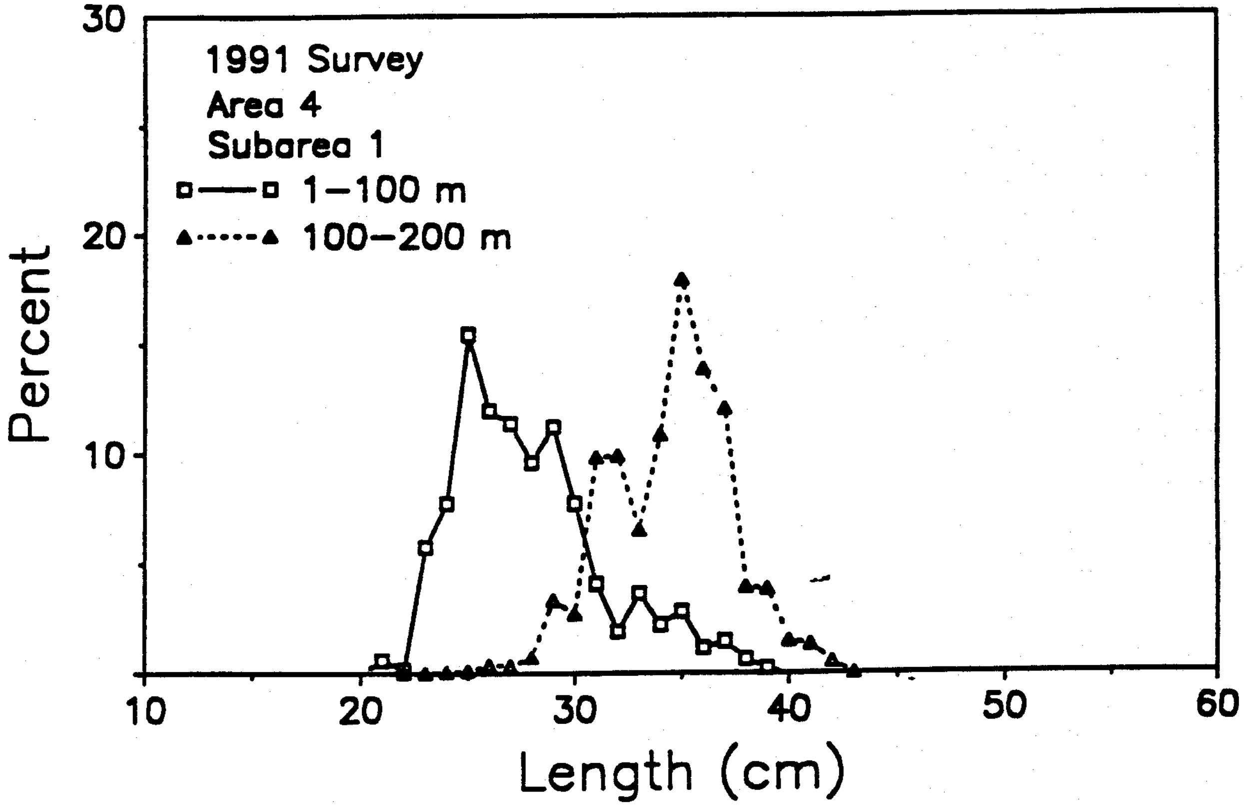


Figure 2.6 (continued)



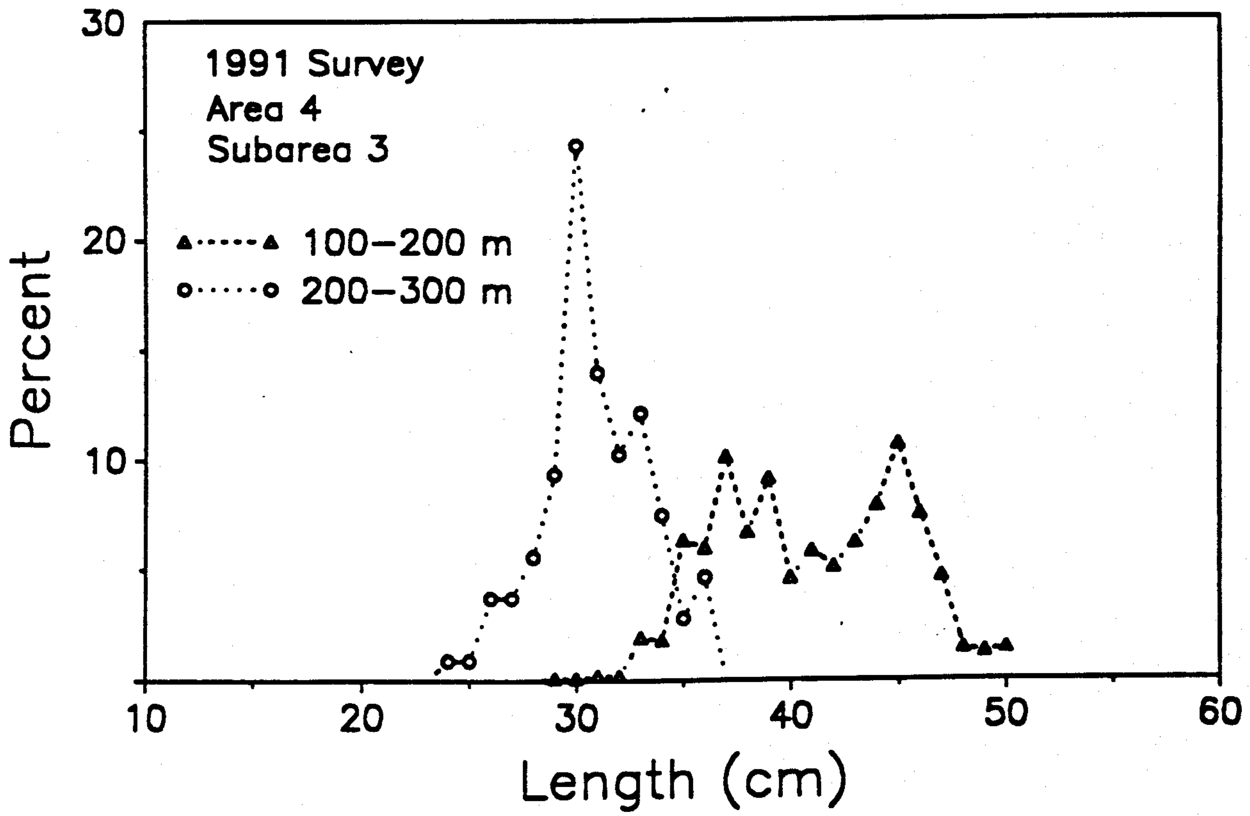
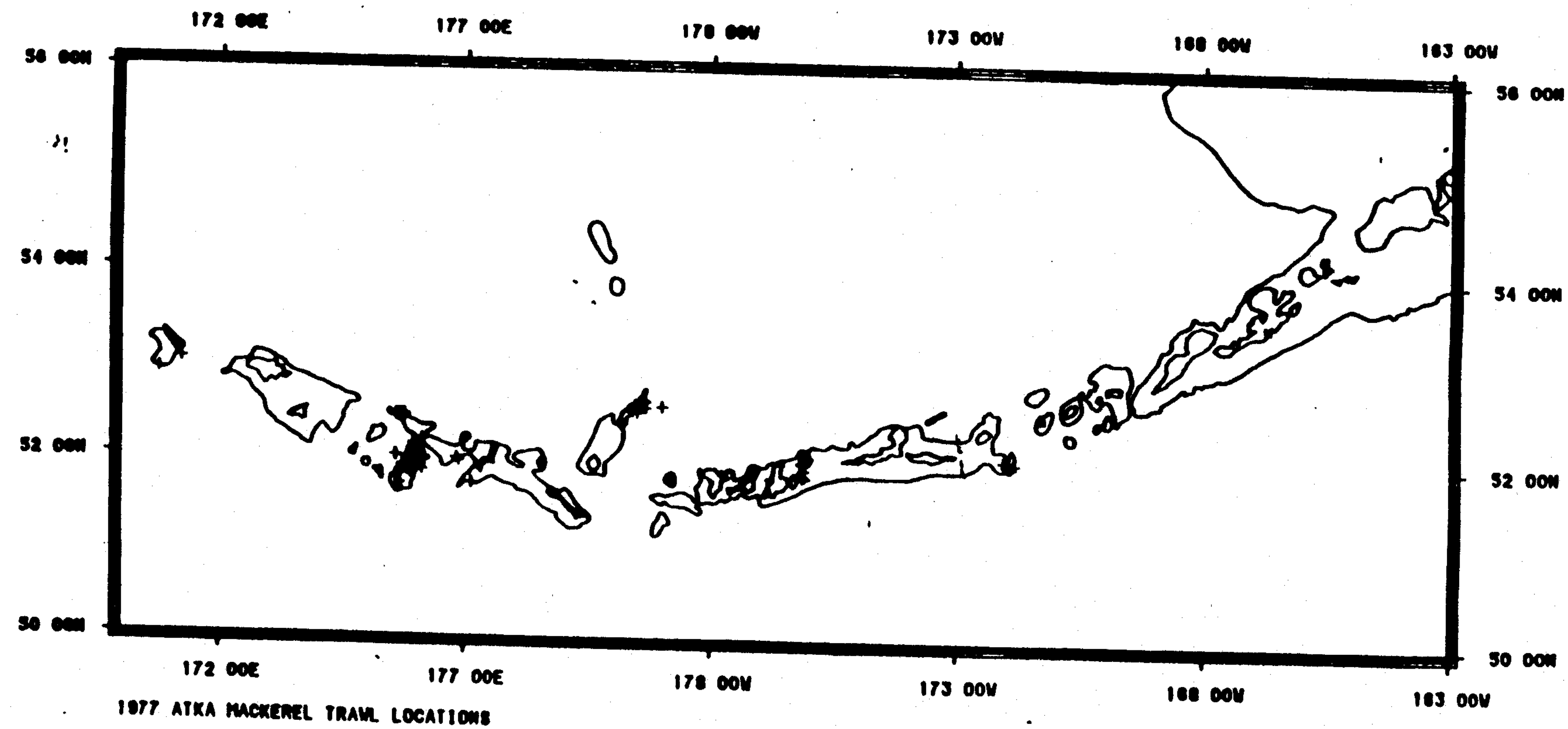
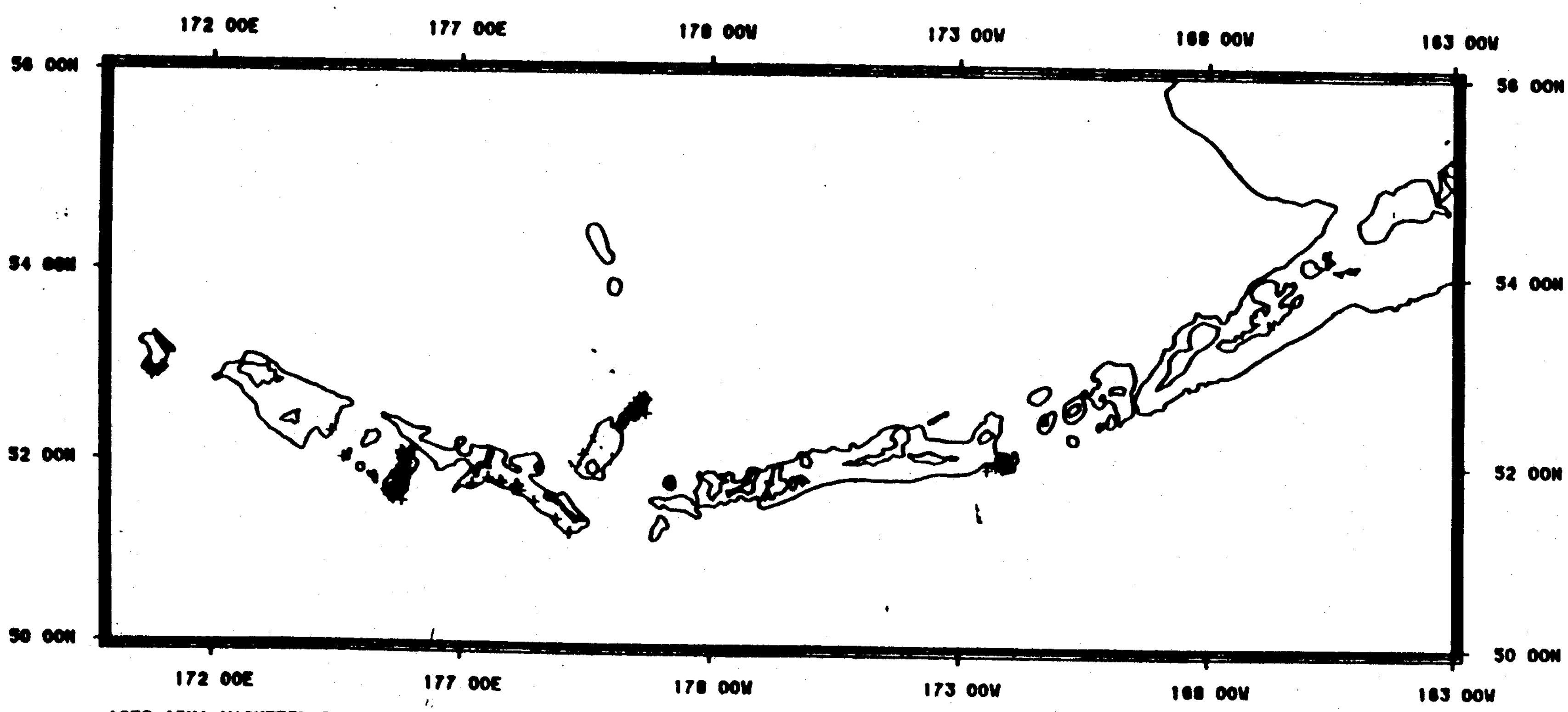


Figure 2.6 (continued)

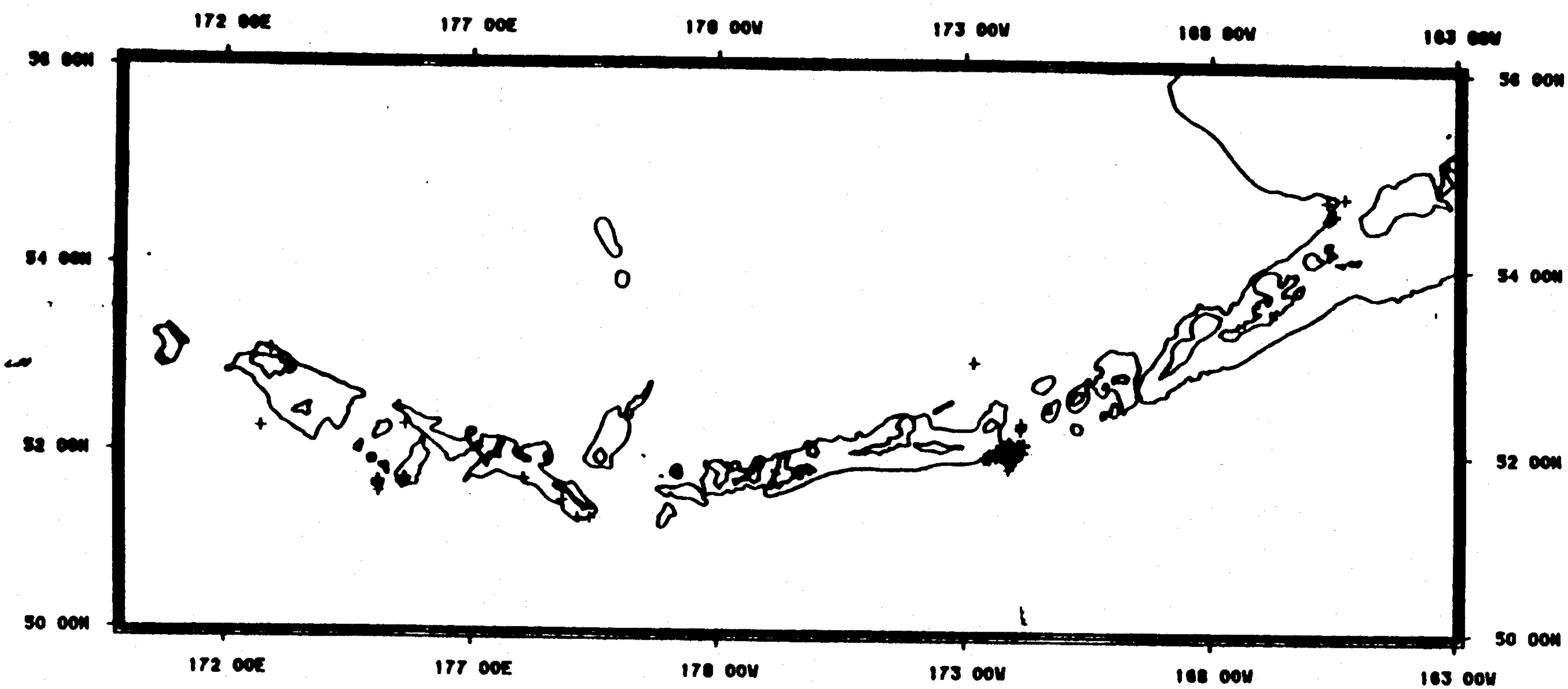


Figures 2.7-2.22 Atka mackerel trawl locations by foreign (includes JV from 1982-88) and domestic vessels each year in the Aleutian Islands from 1977-92. Hauls were assigned to the Atka mackerel fishery based on the catch composition criteria in Table 2.4.



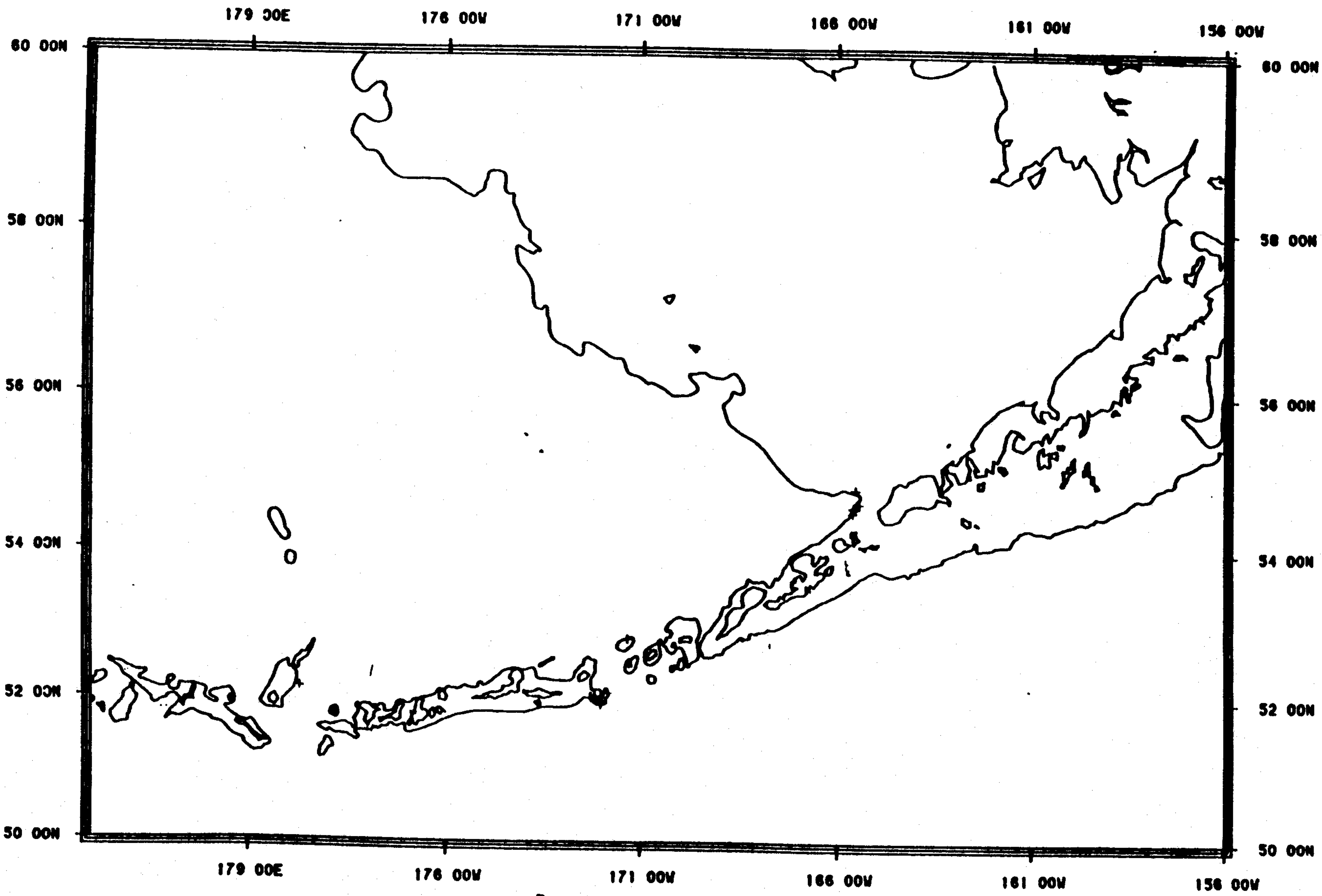
1978 ATKA MACKEREL TRAWL LOCATIONS

Figure 2.8



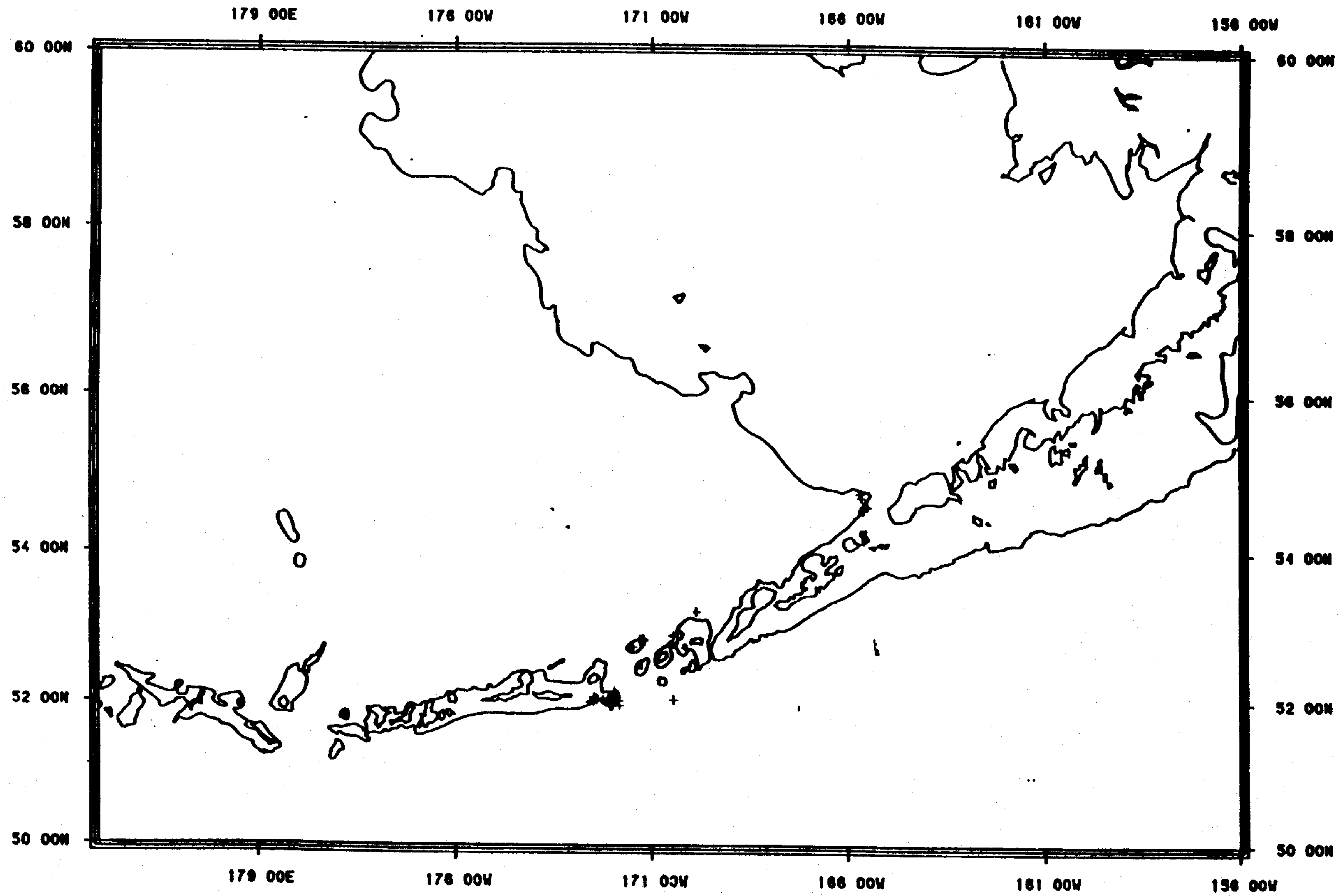
1979 ATKA MACKEREL TRAWL LOCATIONS

Figure 2.9



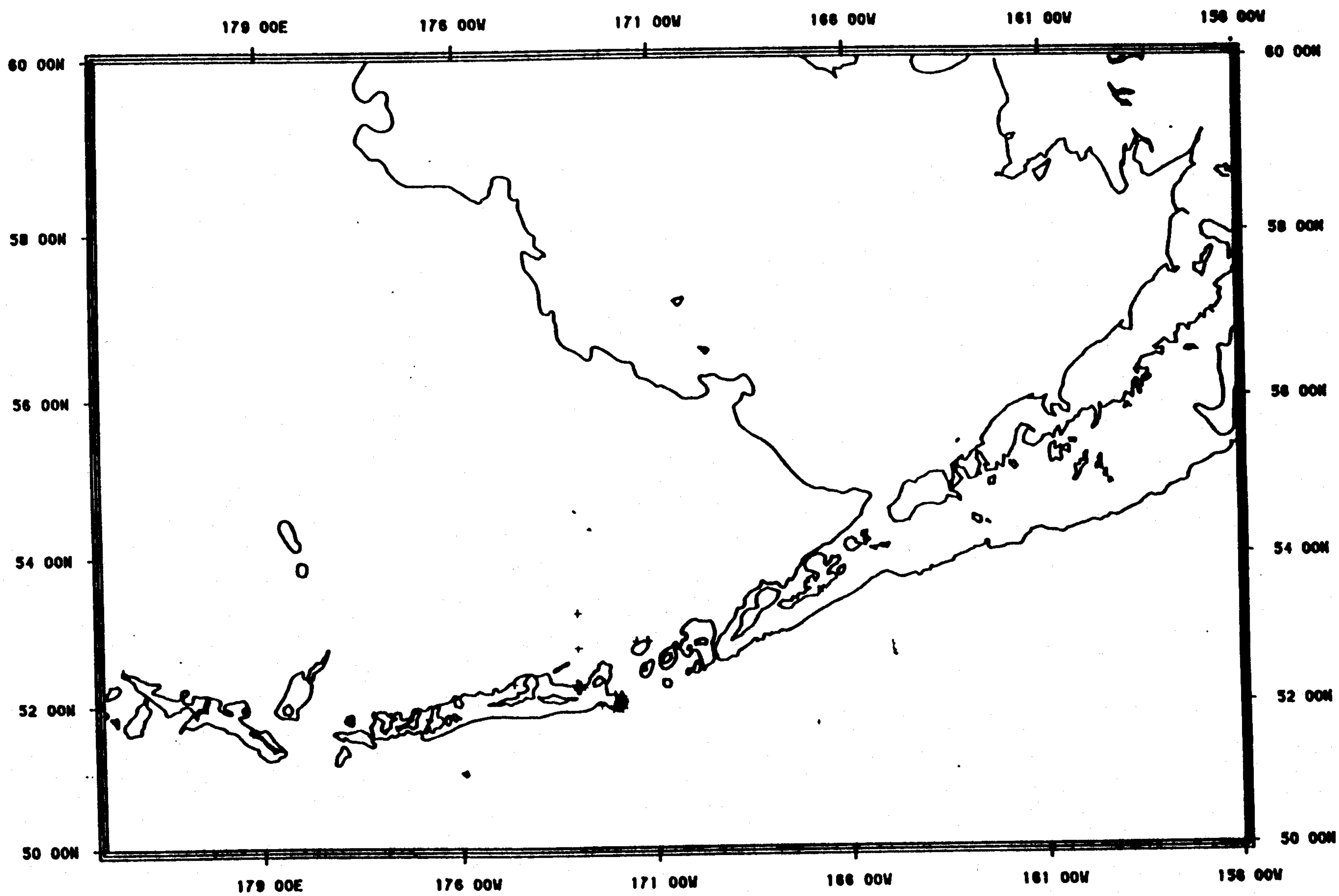
1980 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.10



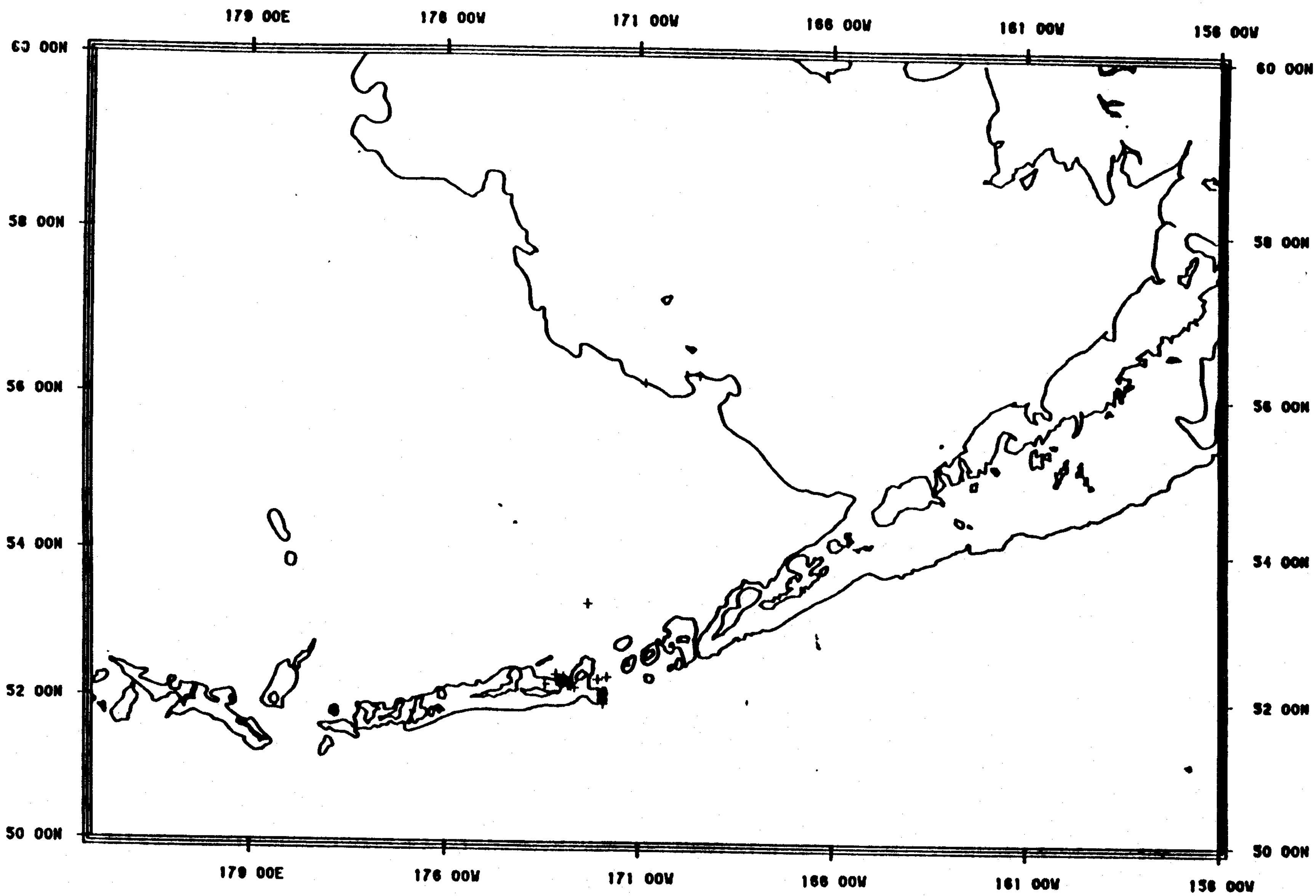
1981 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.11



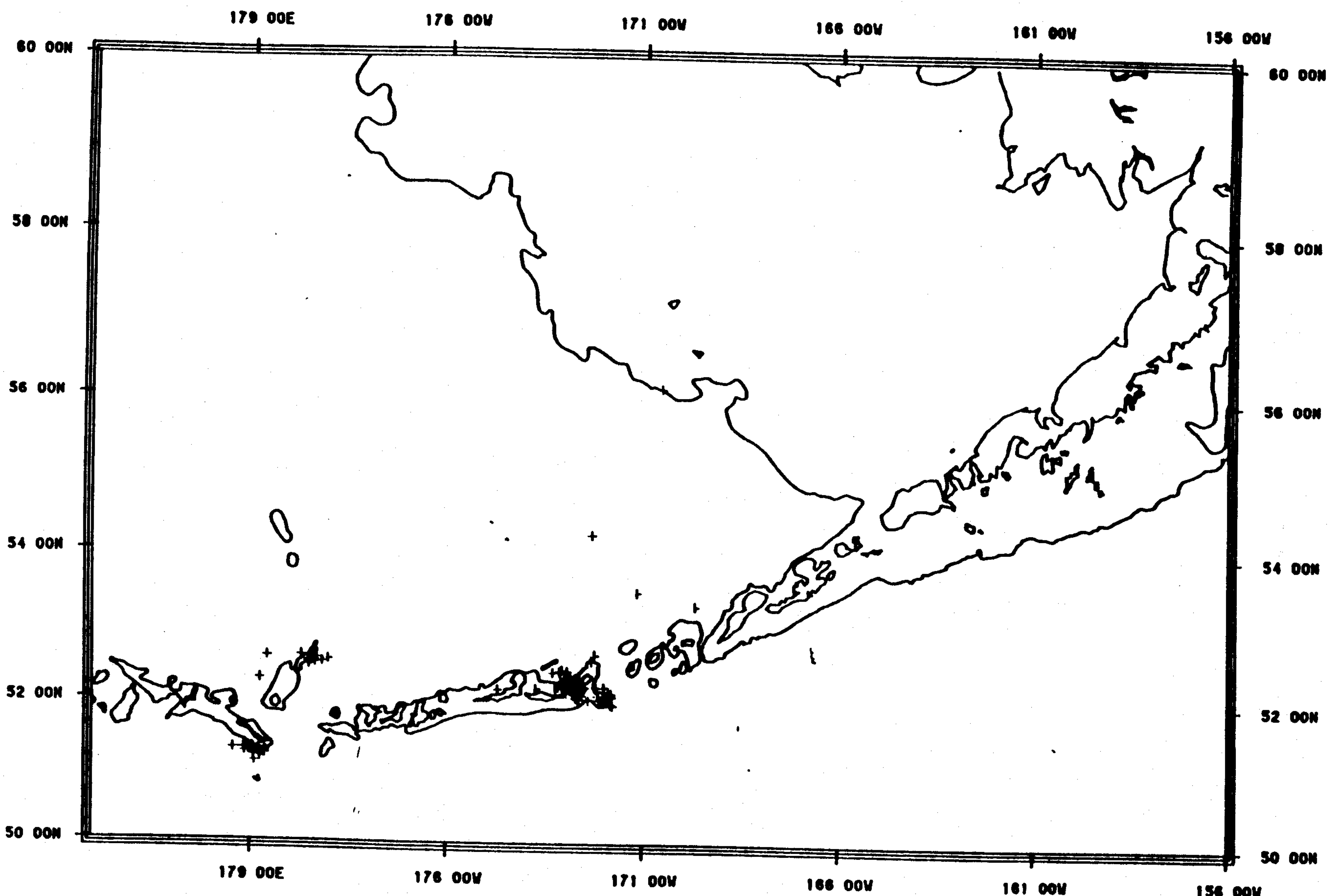
1982 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.12



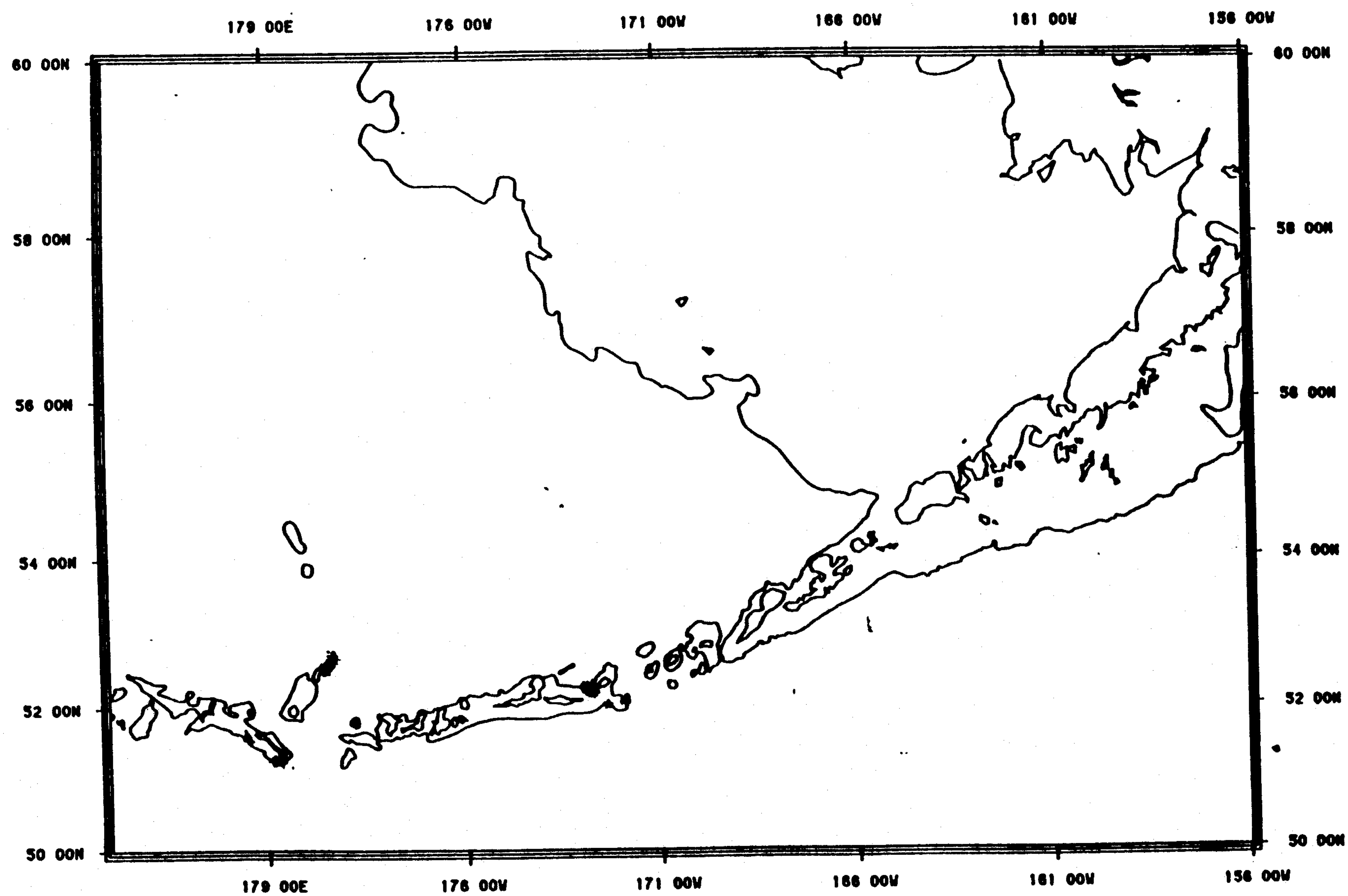
1983 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.13



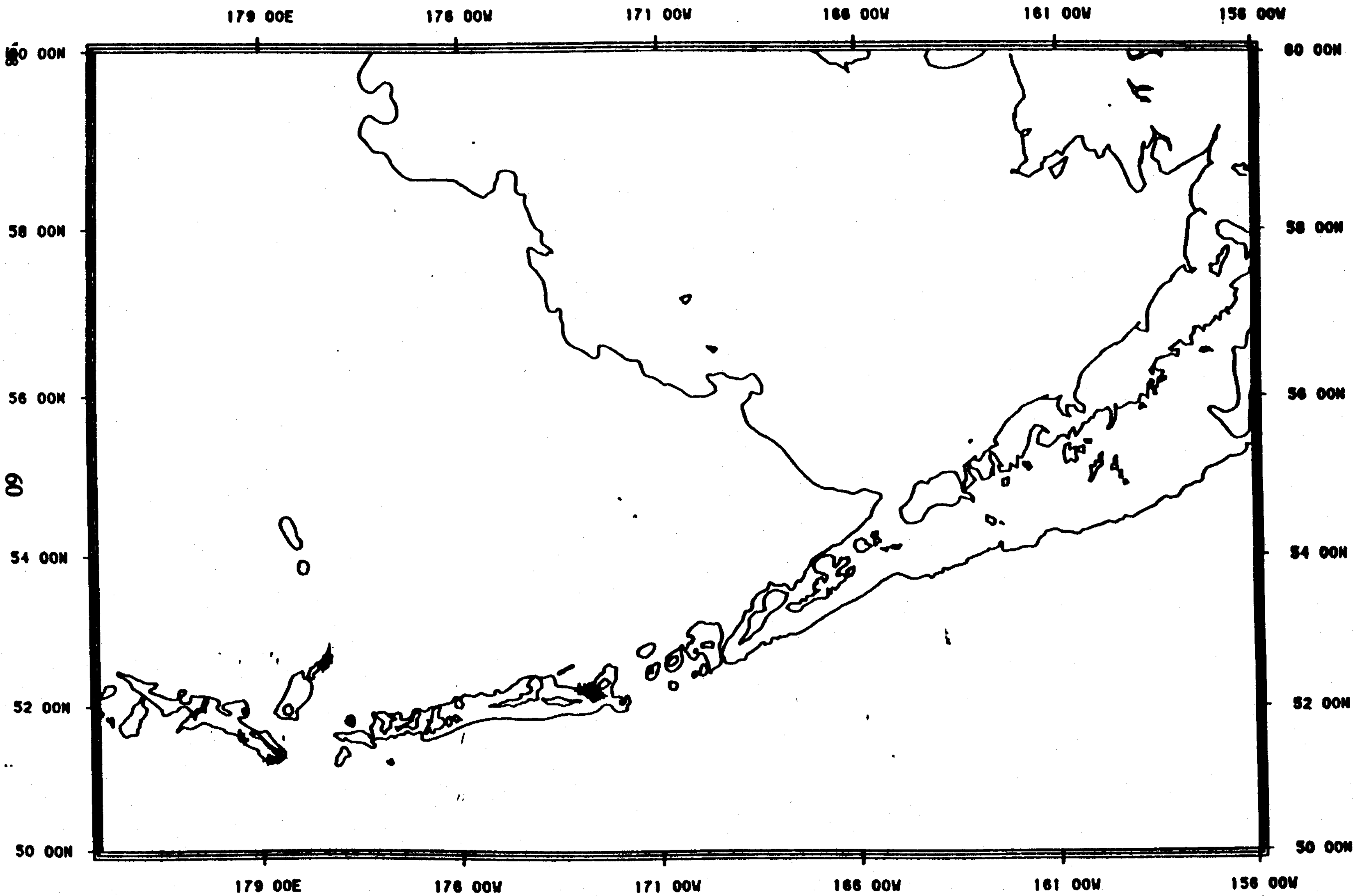
1984 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.14



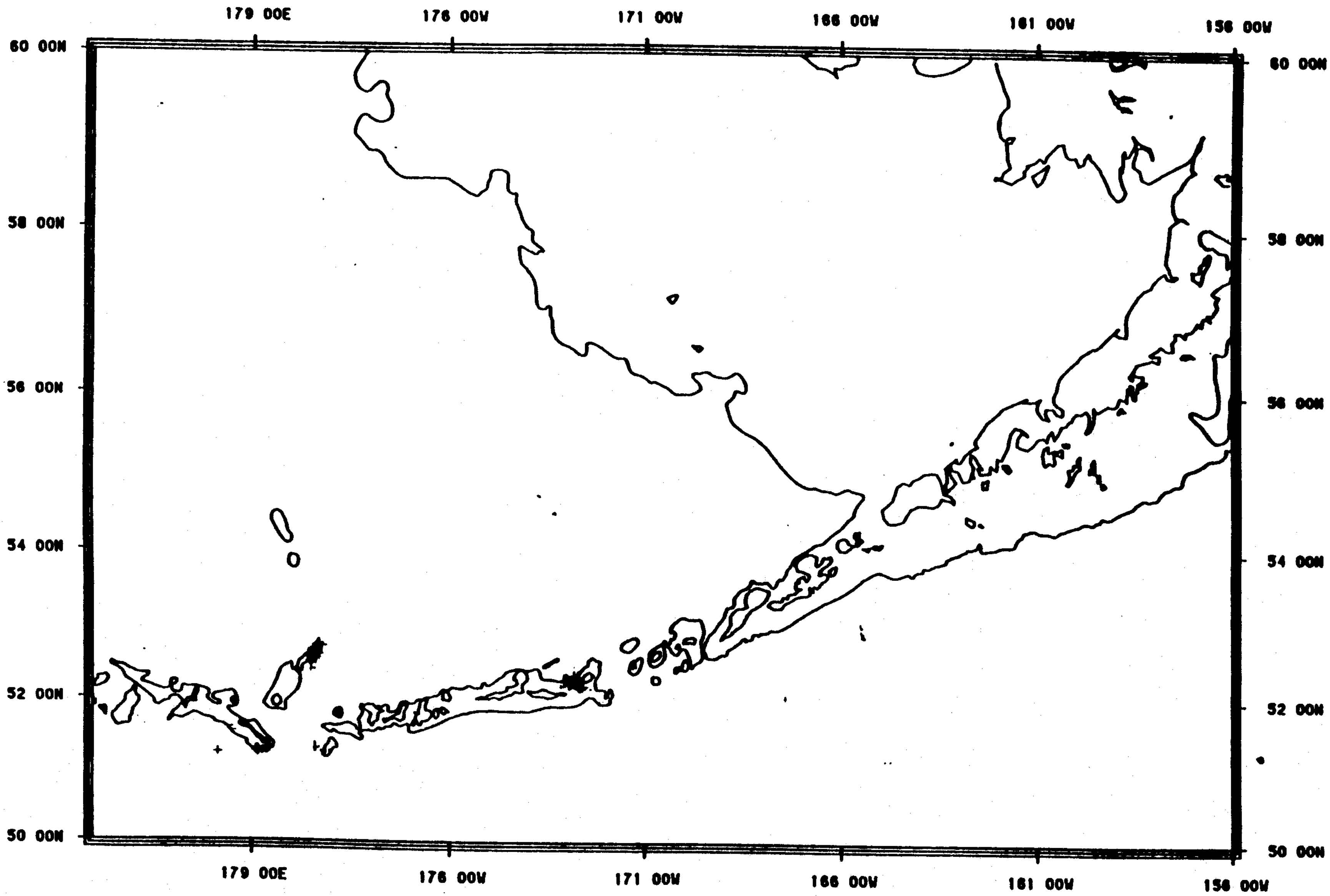
1985 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.15



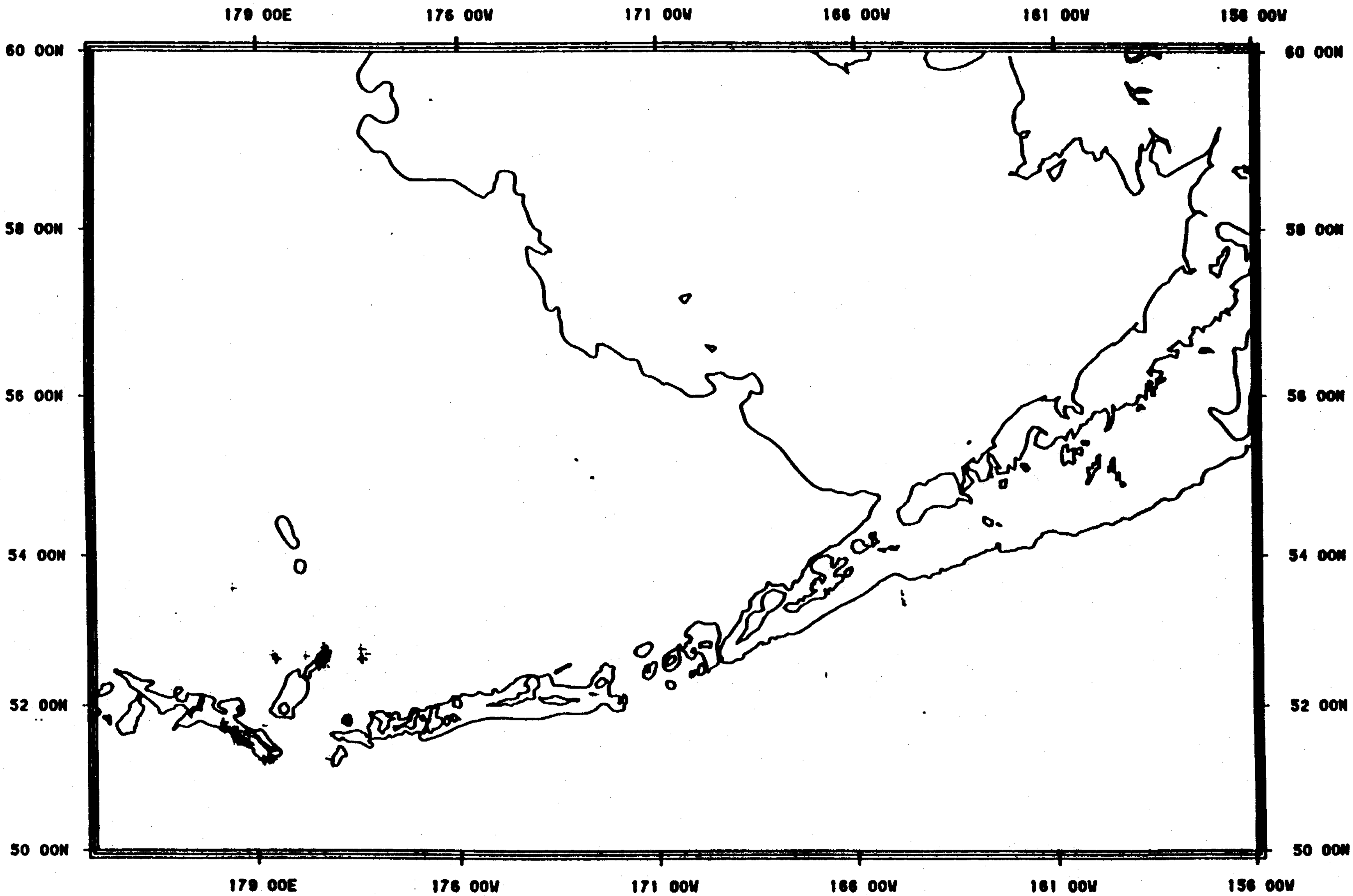
1986 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.16



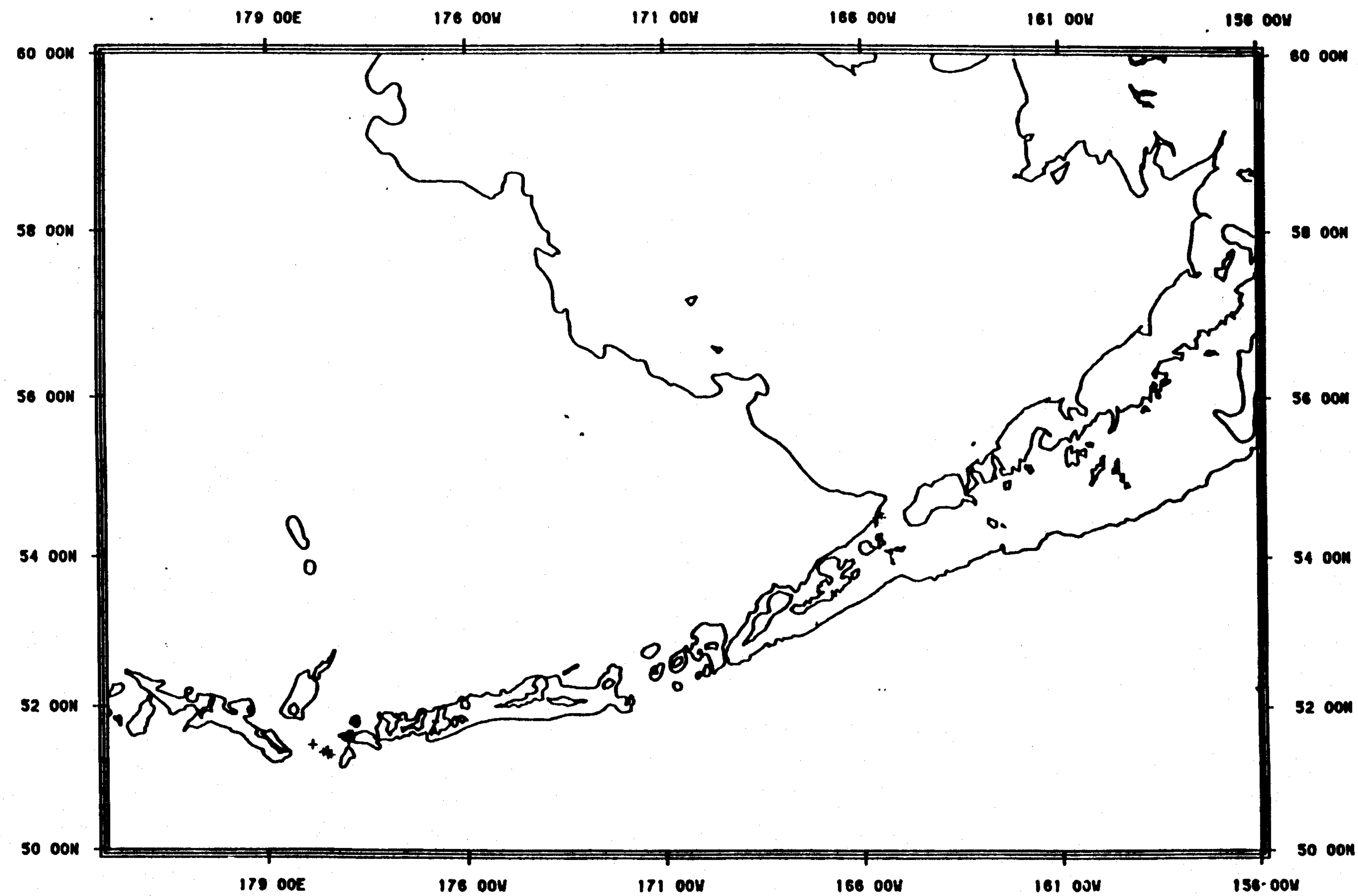
1987 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.17



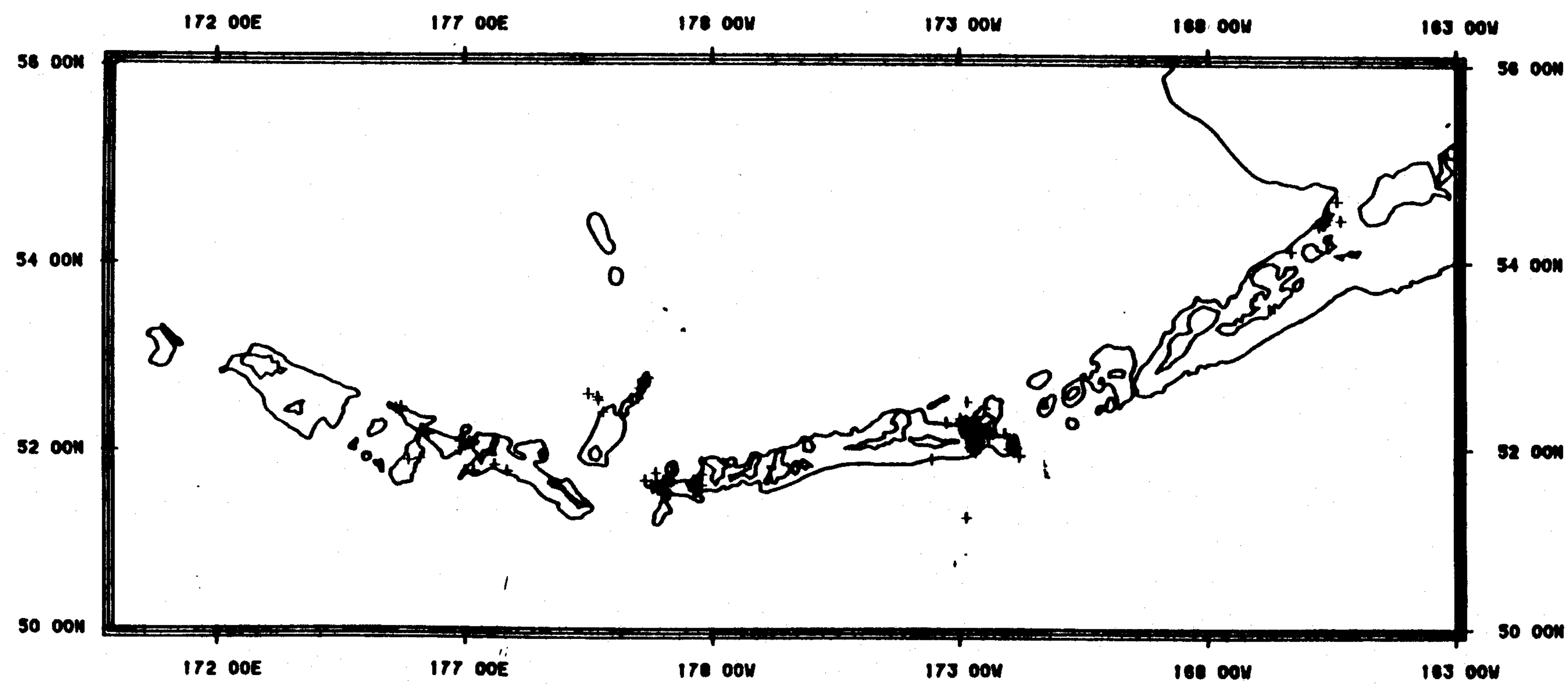
1988 FOREIGN ATKA MACKEREL TRAWL LOCATIONS

Figure 2.18



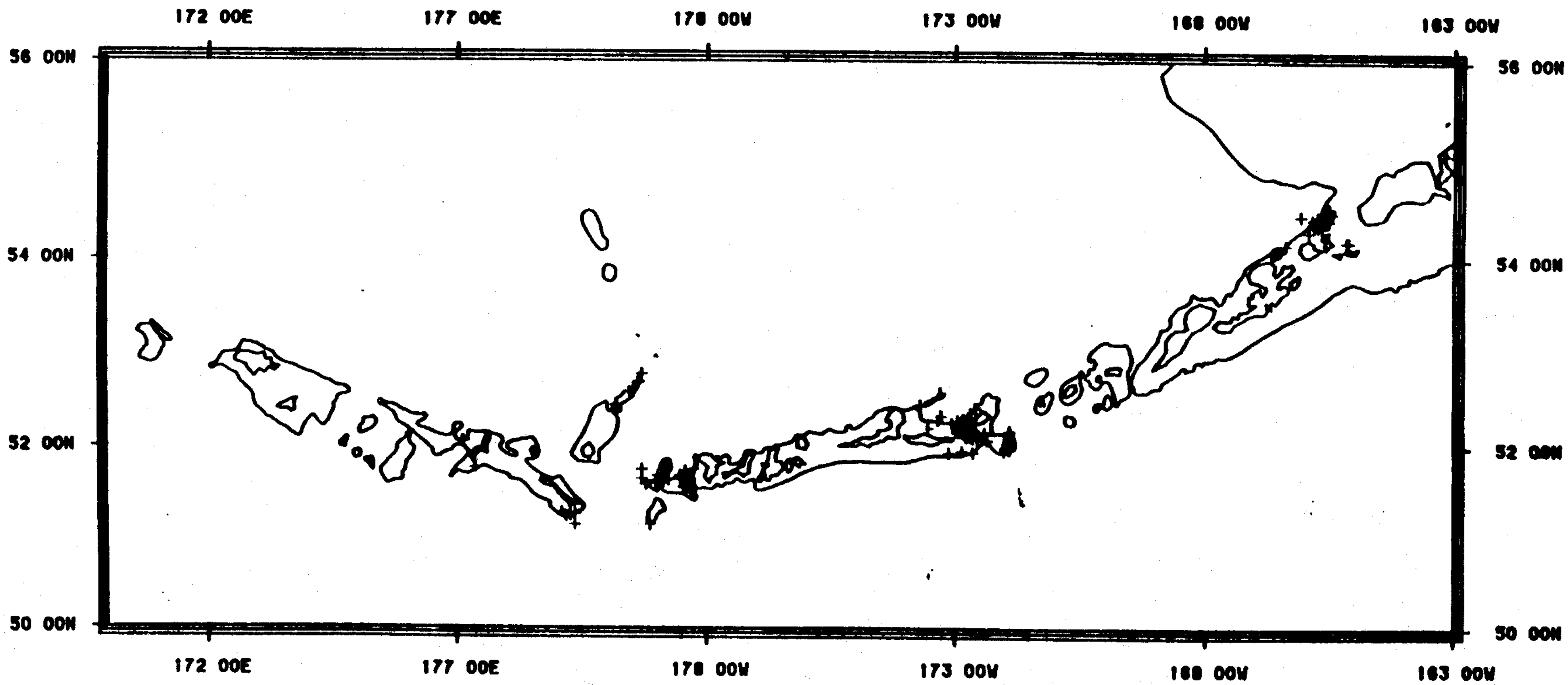
1989 DOMESTIC ATKA MACKEREL TRAWL LOCATIONS

Figure 2.19



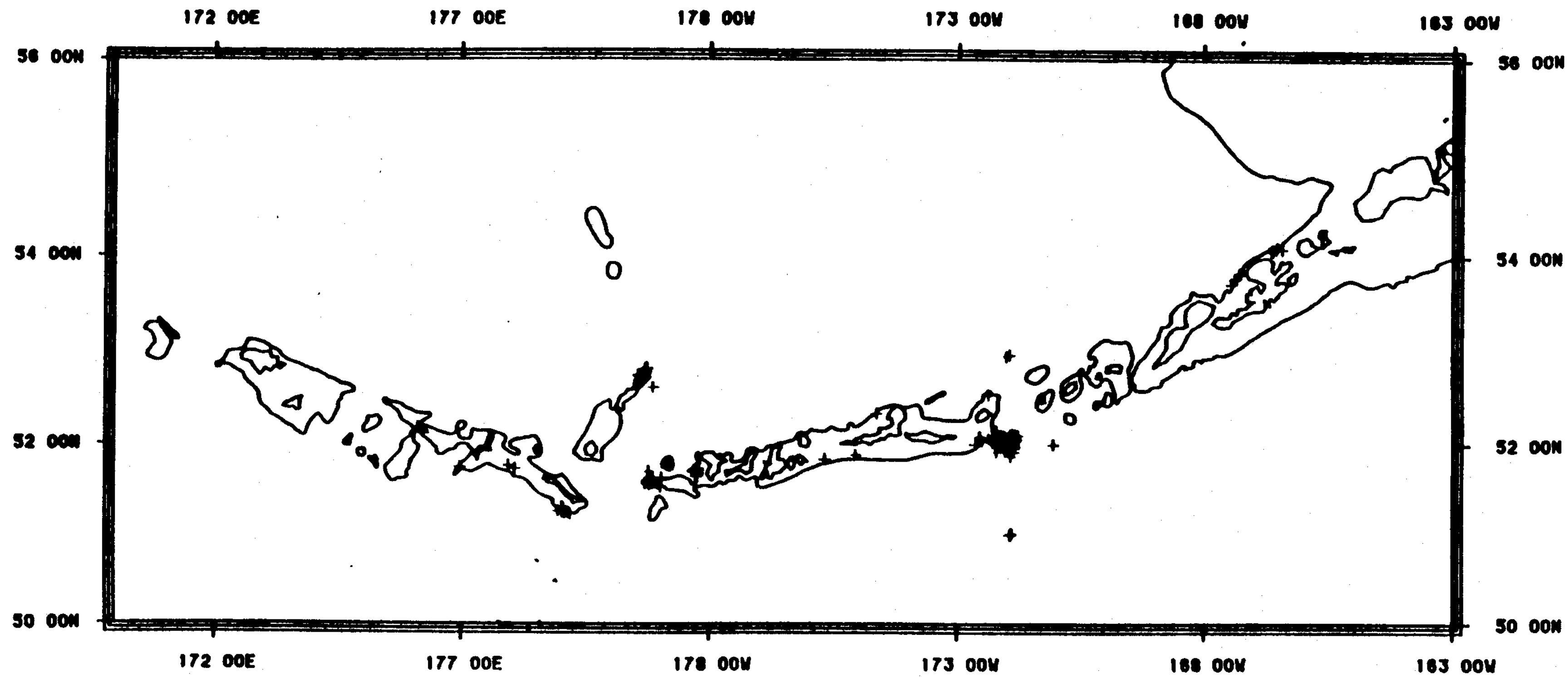
1990 ATKA MACKEREL TRAWL LOCATIONS

Figure 2.20



1991 ATKA MACKEREL TRAWL LOCATIONS

Figure 2.21



1992 ATKA MACKEREL TRAWL LOCATIONS

Figure 2.22

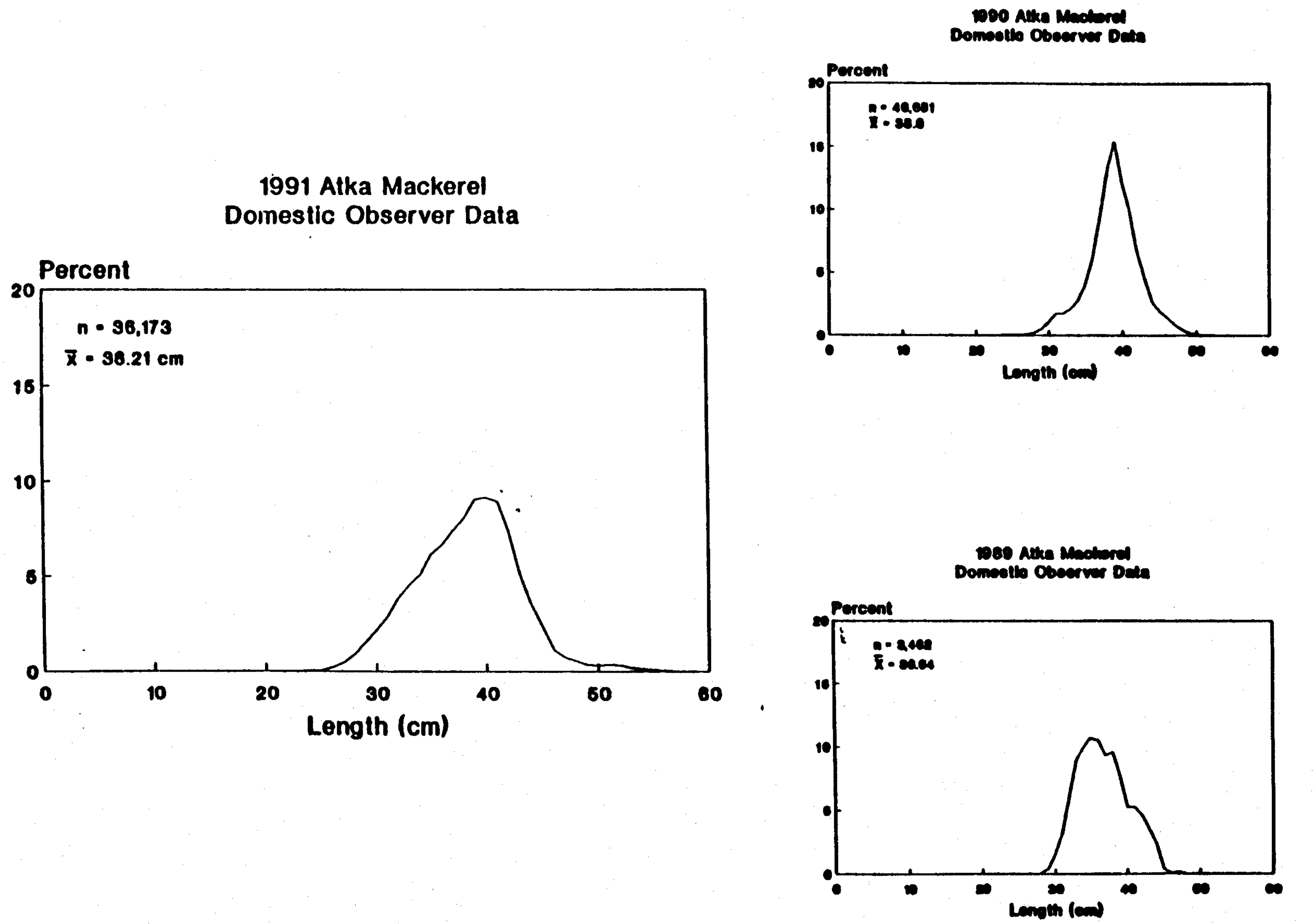


Figure 2.23 Atka mackerel length frequency distributions sampled from the 1989, 1990 and 1991 domestic fisheries in the Aleutian Islands.

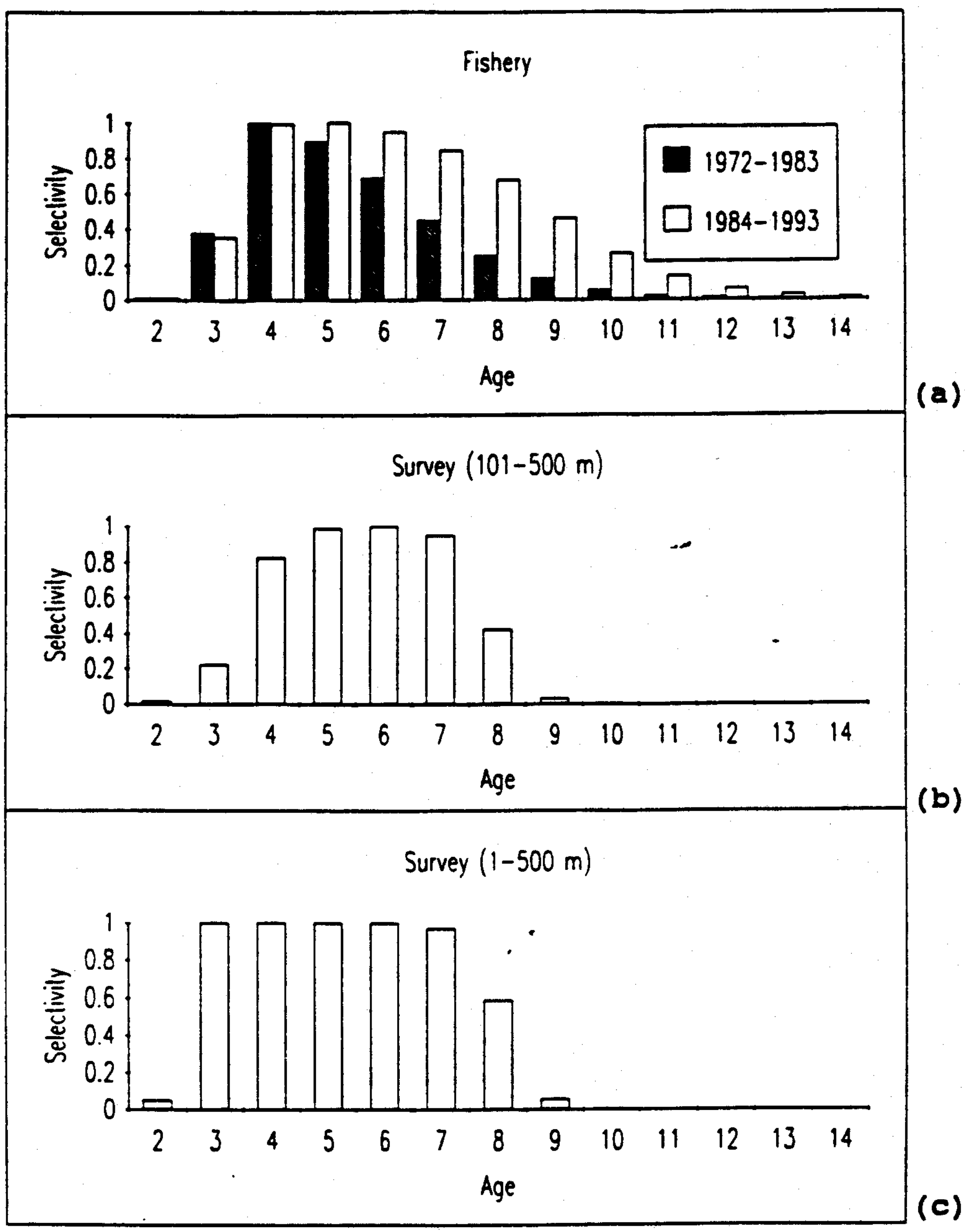


Figure 2.24 Selectivity of (a) the fishery; (b) survey data from 1980, 1983, 1986 and 1991 which excludes the 1-100 m depth strata in the Southwest Aleutian region; and (c) survey data from the 1986 and 1991 surveys for all depth strata.

3.0 REGULATORY IMPACT REVIEW - ECONOMIC ANALYSIS OF THE ALTERNATIVES

Alternative 1 of this proposed amendment would preserve the status quo; i.e., the AI would continue to be undivided, and groundfish TACs would not be apportioned to areas smaller than the entire subarea. Alternatives 2 and 3 would establish 2 and 3 districts within the AI, respectively. This management tool would allow groundfish TACs to be apportioned to areas smaller than the entire AI for those species for which sufficient biological and economic information exists to establish ABCs for the districts. Stock assessments prepared annually for the Council's September-December specification process will provide information on the efficacy of such TAC apportionments for each groundfish species category; at present, the potential for TAC apportionment within the AI is unknown for most species. For 1993, Atka mackerel is the only candidate for TAC apportionment to districts proposed by this rule. Because the candidates for TAC apportionment within the AI, and the amounts of any species that might be specified for each proposed district are unknown, the following economic analysis is concerned only with Atka mackerel.

Statistical information on production and import/export trade for Atka mackerel tends to be fragmentary in some series. Atka mackerel statistics are often combined with those for true mackerels, but not consistently. Some Atka mackerel data may, instead, appear in "other groundfish" reporting categories. Numbers cited below should be interpreted with these caveats in mind.

3.1 World Markets for Atka Mackerel

According to preliminary trade data and information from industry sources, Atka mackerel markets are principally Asian, with Japan being the largest consumer, followed by South Korea. The Food and Agriculture Organization of the United Nations (FAO) reports that, in 1989 (the latest year for which these data are available) Japanese domestic fisheries were the largest single producer of Atka mackerel in the world, accounting for more than 77% of total world landings of this species in that year. Over the period 1986 through 1989, the Japanese harvest share of total world Atka mackerel landings varied between the mid-60% and mid-70% range. In 1989, the United States was a distant second at just over 12%, followed by the former USSR at 7%, and the Republic of Korea at roughly 3%. Over the same period, the U.S. share of total world Atka mackerel landing declined from just under 23% to the 12% cited for 1989 (FAO Fisheries Yearbook, 1989).

Traditionally, Japanese domestic fisheries supply the vast majority of the Atka mackerel consumed in Japan, with smaller quantities being imported from Korea, the former USSR, and the United States. According to industry sources monitoring groundfish production and trade, in 1992 the Japanese domestic Atka mackerel fishery "failed". A review of preliminary landings data from the Japanese ministry of Agriculture, Forestry, and Fisheries suggest that catches through the first 8 months of 1992 were down nearly 18,000 mt from the equivalent period in 1991.

This unanticipated shortfall of domestic supply in the Japanese market was crucial for U.S. producers, who, in that year, captured 60,060.7 mt of Atka mackerel in the U.S. EEZ (43,857 mt of which came from the AI). This total catch greatly exceeded the 1991 reported landings of approximately 29,000 mt, and resulted in export sales of approximately 10,000 mt (round product) to Korea, and 17,000 mt (dressed weight), and an additional 3,000 mt of Atka mackerel surimi, to Japan.

Atka mackerel is a dark fleshed, oily, and at present, relatively low valued groundfish. In Japan, Atka mackerel is consumed in a variety of forms, including fresh, fresh/frozen, and salted. In addition, Atka mackerel is one of several alternative fish species, used as an input to low grade surimi-based "neriseihin" products, such as "satsumaage" (fried), and fish sausage, and fish ham (per.

com., John Sproul, Hokkaido University, Nov. 1992).

Atka mackerel is also harvested by Korean fisheries for domestic consumption. These supplies are supplemented by imports of Atka mackerel from the United States (and perhaps other sources). For the most part, Korea imports Atka mackerel "in the round", where as, Japan tends to import H&G, Atka mackerel surimi, and some fillets.

Reportedly, some Atka mackerel, exported from the United States to Korea, is reprocessed there for subsequent export to Japanese markets. The amount of fish that enters this supply network is not known; it is assumed to be relatively small.

Sources familiar with the Japanese market for Atka mackerel suggest that the market can be "volatile". The same is likely true of the Korean market. While reliable price series for the Japanese Atka mackerel market for imported products are not readily available, data on the "fresh" market seems to confirm the reported price variability for this species. Note, not only the intra-seasonal change, but the apparent inter-seasonal trend.

Monthly Japanese Landings Market Prices for Atka Mackerel
1983 - 1992, in Yen/kilogram (weighted average)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1983	89	97	105	148	126	146	232	238	162	81	102	59
1984	84	79	127	210	170	201	263	175	179	109	82	59
1985	50	89	122	114	144	147	208	182	78	59	64	56
1986	60	93	93	103	149	99	124	73	86	62	49	55
1987	57	44	54	76	67	45	42	41	36	71	42	50
1988	40	41	80	59	86	63	87	90	44	48	37	33
1989	41	37	42	40	47	36	31	55	46	106	53	44
1990	42	54	45	50	42	48	59	61	57	64	79	85
1991	65	93	111	90	101	120	168	143	93	79	80	57
1992	47	36	65	85	88	91	136	95	na	na	na	na

Source: Monthly Stat. of Agriculture, Forestry, and Fisheries, Stat. and Info. Dept., Ministry of Agriculture, Forestry, and Fisheries, Government of Japan. October, 1992.

Atka mackerel has several close substitutes, including among others, jack mackerels, horse mackerels, and boarfish. While detailed data on Japanese markets and prices are scarce, information that is available suggests that prices can take wide swings over the course of the year in response to changes in supply and, perhaps, seasonality in demand. For example, the Bill Atkinson News Report (Issue 389, March 1991) indicates that in that year, "(U.S.) DAP landings of atka mackerel... have been earlier than usual. In Japan, the market has gone from a high of 500 yen/kilo ($1.68/lb) last year, to a low of 245 yen/kilo ($0.82/lb) early this year. Prices have improved slightly - to 270 yen/kilo ($0.91/lb)." By July of 1992, Atkinson was reporting that in response to the jump in supply of Atka mackerel to the Japanese market, "Sales are nil, as most of the processors are holding stocks of higher-priced product purchased earlier in the year. Some processors are even selling off inventories at 200 yen/kilo ($0.72/lb) or less."

Atkinson goes on to report that the Atka market is being further impacted by unexpectedly large supplies of competing species. Because of excessive supplies of these substitutes for Atka mackerel,

product prices were driven to very low levels. In one specific example, reported in 1992 by Atkinson, "...boarfish fillets (were) competing with Atka mackerel for space on the supermarket counter." Because the market price of these competing species was (relatively) so low, Atka mackerel sales effectively declined to zero.

As noted above, while some U.S. caught Atka mackerel are marketed in Korea, it is the Japanese market into which most of the U.S. catch is, at present, sold. These reports all strongly suggest that the Japanese market for Atka mackerel is relatively price sensitive. Being, far and away, the largest Atka mackerel market, and traditionally the major fishery producer for this species, the Japanese market effectively sets prices for the rest of the world for Atka mackerel. This, and other evidence pertaining to the Japanese market, suggests that significant supply "shocks" in this lower-end seafood commodity group can be expected to seriously impact retail price. In turn, this would be expected to translate into equivalent price responses in the Japanese wholesale and exvessel markets, ultimately affecting prices in the U.S. Atka mackerel fisheries.

3.2 The Economic History of the Proposed Action

As proposed, Amendment 28 to the BSAI Groundfish FMP subdivides the Aleutian groundfish fisheries management subarea into either two or three districts. The practical effect of the amendment will be to provide the Council with a "mechanism" by which it may, in the future, recommend to the Secretary the spatial apportionment of TACs for groundfish (during 1993, a potential increase in Atka mackerel TAC). In order to facilitate an increased 1993 TAC for Atka mackerel, an apportionment from the non-specific operational reserve action that will be considered by the Council at its June 1993 meeting, the proposed amendment includes a revision of the 1993 specifications of ABC and TAC for that species.

Under the status quo, the AI constitutes a single management unit, as part of the BSAI Groundfish FMP. The subarea stretches from 170°W longitude on the east to 170°E longitude on the west, and extends above and below the Aleutian chain.

Atka mackerel are distributed from the Kamchatka Peninsula, throughout the AI, north to the Pribilof Islands in the eastern Bering Sea, and eastward across the GOA to southeast Alaska. They are most abundant in the AI, according to the best available survey data. Once they assume the demersal phase of their life history, Atka mackerel populations appear to be localized (Lowe 1992).

While Atka mackerel are harvested in the U.S. EEZ off Alaska, either as target catch or bycatch, the vast majority of landings are taken from the AI. Historically, the Atka mackerel fishery in the AI was dominated by foreign, and then joint-venture, operations. Throughout the decade of the 1970s and into the early 1980s, the Atka mackerel resource was utilized almost exclusively by the distant-water operations of the U.S.S.R., Japan, and Korea. Beginning in 1980, U.S. joint-venture operations entered the fishery, and over the period 1982 through 1988 came to dominate the harvest. Only since 1989, with the final elimination of direct foreign participation through either TALFF or JVP allocations, has the fishery been exclusively prosecuted by wholly domestic operations.

In the early 1970s, most of the Atka mackerel harvest was reported to have come from the western AI, west of 180°W. By the end of the decade, fishing effort had moved eastward. From 1980 through 1992, as much as 99% of Atka mackerel landings came from east of 180°W, and most of that from the area bounded by 171 degrees W and 174°W. Over each of the last three seasons (i.e., 1990, 1991, 1992), under a wholly domestic fishery, the distribution of landings, 170°W - 177°W and 177°W - 177°E, has been approximately 56%-44%; 69%-31%; and 67%-33%, respectively.

The U.S. domestic Atka mackerel fishery is primarily a trawl fishery, although small amounts of Atka mackerel are also taken by other gear types, including longline, pots, and nets (other than trawl). In 1992, for example, trawlers accounted for 99.88% of the total reported catch of this species in the BSAI fisheries. These trawl fisheries are prosecuted, primarily, by large catcher/processors, although mothership operations have also participated. In 1992, for example, NMFS "Blend" data identified 25 catcher/processors and two motherships recording directed landings of Atka mackerel in the AI fishery. Observer data reported 24 vessels participating that year. [The difference may be in the way a vessel was classified based upon its "target" catch.]

Since 1989, when the fishery became solely domestic, the timing and duration of the fishery has changed. PacFIN landings data for the period 1989 through 1992 demonstrate that in the beginning of this period, the Atka mackerel fishery was characterized by peak landings in July, August, and September. This pattern evolved, with each successive year seeing an earlier peak season of catch. In 1990, for example, the peak months were April, May, and June. In subsequent seasons the domestic fishery has taken place in the winter and early spring, with peak reported landings in January, February, March, and (in 1992) April. Indeed, in 1992, the Atka mackerel TAC of 43,000 mt was obtained early in the year, resulting in the closure of the directed fishery on 16 April. In reality, the TAC was exceeded in that year, with reported catches for the AI reaching 43,857 mt (PacFIN).

In connection with this fishing pattern, as noted above, virtually all of the effort is concentrated in the more easterly segments of the management subarea.

Atka Mackerel Landed Catch (mt) for the Aleutian Area

	Jan.	Feb.	Mar.	Apr.	May	June
1992	2524	4584	19894	15931	479	83
1991	5256	2941	12765	22	20	--
1990	1	--	253	2739	6841	11666
1989	--	--	--	130	655	794
	July	**Aug.**	**Sept**	**Oct.**	**Nov.**	**Dec.**
1992	349	14	TR	--	--	--
1991	TR	--	--	--	--	--
1990	224	--	--	1	--	--
1989	2295	7645	3138	83	6	436

Source: PacFIN Report #220, 29 October, 1992

This prevailing fishing pattern, and the nature of Atka mackerel population concentrations, has resulted in concern about the potential for overfishing localized stocks. In response, the Council set the Atka mackerel TAC for the Aleutian subarea at a level which will protect localized stocks from over-exploitation.

In 1992, the potential harvest of Atka mackerel, based upon the size of the available biomass for the Aleutian subarea, was estimated to be 351,300 mt. For a number of reasons, both biological and economic, the Council determined that this entire amount should not be released to the fishery in the first year. Instead, the Council proposed that the TAC increase should be phased in, incrementally, over a 6-year period. This formula, when applied to the 1992 fishing year, produced a TAC of approximately 43,000 mt.

In 1993, the TAC could have risen to 117,100 mt, under the approach proposed by the SSC. But, principally because of concern about overfishing of localized stocks, and the inability of the Council to distribute the TAC (and thus the fishing effort) more broadly across the Aleutian management subarea under the status quo, the proposed TAC was limited to 32,000 mt. This is a harvest level which, according to stock assessment data, can be safely supported by the stocks in the eastern segment of the subarea. This represents only approximately 27% of the potentially available 117,100 mt TAC. Expressed another way, in large part because of conservation considerations, the status quo effectively precludes the release of 85,100 mt of Atka mackerel to domestic fisheries in the AI (i.e., 117,100 - 32,000 = 85,100).

3.2.1 Revenue Implications

At prevailing 1992 average exvessel prices (as reported by PacFIN), this difference in Atka mackerel TAC for the Aleutian management subarea could generate gross exvessel revenues of $23.62 million. This may not be a very useful estimate of the actual economic implications of retention of the status quo because the current Atka mackerel fishery in the Aleutian subarea is almost exclusively prosecuted by catcher/processor vessels. Therefore, the PacFIN exvessel price may not be very indicative.

Sources familiar with the catcher/processors sector suggest that, in 1992, the average processed product price, FOB Alaska, for Atka mackerel produced by U.S. catcher/processors was between $.50/lb and $.80/lb. (This was primarily H&G, round, and surimi. Fillets represented a sufficiently small part of the total output that the numerical example presented below is not seriously harmed by the simplifying assumption that this price range is comprehensive.) Based upon processor product reports for 1992, the weighted average product recovery rate for Atka mackerel, for all products, was just under 63%. Assuming approximately this same product mix in 1993 and beyond, the gross wholesale processed product value, FOB Alaska, of the 85,100 mt TAC difference could be between $59 million and $94 million.

This estimate represents the upper-bound gross economic value of the potential 85,100 mt differential in Atka mackerel TAC, as measured as a first wholesale processed product, FOB Alaska, although for a number of reasons, one would not expect the actual impact to be this large. For one thing, these gross estimates would have to be reduced by the incremental cost incurred to capture and process this additional TAC.

In 1992, for example, NMFS observer data report 24 vessels participated in this fishery. Assuming a catching capacity of 1,000 mt/day for this fleet (based on the approximate daily catch rate recorded

in this fishery in 1992), and an average cost of operation per vessel per day of $22,500 (an estimate obtained from several industry sources, as well as, the "Inshore/Offshore" analysis) the estimated cost of harvesting and processing the additional 85,100 mt TAC would be $45.9 million.

This suggest that the net revenues to U.S. operators, as measured at first wholesale FOB Alaska, could be between $13 million and $49 million. It is probable that this still overstates the actual value of this 85,100 mt increment.

3.2.2 Price Effects

Among the most significant reasons for discounting the size of this estimate is the probable price effect that would accompany an increase in supply of Atka mackerel of this magnitude. Very little empirical analysis of the Atka mackerel market is available. However, all indications are that a significant increase in the supply of Atka mackerel from the U.S. fishery would, almost certainly, have a severe negative effect on prices at every level of the market. Some industry sources speculate that, if the quantity of Atka mackerel harvested and marketed by U.S. fisheries increased from the 1992 levels to the potential 1993 TAC of 117,100 mt in a single year, the price of Atka mackerel could be expected to decline sharply. They conclude that the sharpest price declines would likely be in the H&G and "round" product forms, with perhaps less immediate impact on Atka mackerel surimi and fillets.

While no empirical analysis has as yet been undertaken, there is a growing sense that, in the latter half of 1992, the world groundfish market was generally in a depressed state. Under these conditions, it is even more probable that a large and sudden increase in supply of Atka mackerel would have a large adverse effect on price. In this case, it is probable that all producers, no matter what the product form, would experience difficult times, until the market reached a new equilibrium level, and/or alternative markets were developed.

Anecdotal information suggests that prices could decline by perhaps as much as 30% to 40%, in response to sharply increased U.S. catches of Atka mackerel. While no quantitative measure of what constitutes "sharply increased" U.S. catches can be given, it is probable that this threshold exists at levels below the 85,100 mt TAC differential.

Reportedly, intra-seasonal U.S. exvessel and export wholesale prices in 1992 were very sensitive to the volume and timing of landings. One source reported that, while prices were relatively firm at the opening, as supplies began to hit the market, prices softened significantly. In response, catches declined somewhat, and this caused prices to firm. When sizable landings resumed, prices once again declined sharply. If these reports are correct, they suggest that price is highly sensitive in the exvessel market for U.S. Atka mackerel, a finding consistent with earlier reported Japanese and Korean market information.

Presumably, fishing operations would respond to a sharp decline in price by reducing their fishing effort. If price fell sufficiently, the Atka mackerel fishery would cease until prices once again supported profitable operation. One may conclude that the setting of the TAC need not explicitly concern itself with this issue, since the market will, in large part, determine the appropriate catch.

Unfortunately, in an open access management environment, characterized by significant excess capacity and few viable alternatives, short run considerations may induce operators to fish at an economic loss, so long as they believe they will be able to cover variable operating expenses. This behavior could, under one set of assumptions, result in excess capacity remaining in the fishery when,

from an economic efficiency perspective, it should be removed. Council consideration of economic market failure in the setting of TAC may be a logical outcome.

3.2.3 Opportunity Costs

In addition, should the Council choose to increase the Atka mackerel TAC to the full extent available under the formula, there would be an implicit "opportunity cost", in the form of foregone catch of some other species, to account for. That is, because the 2 million mt cap in the BS is virtually fully subscribed, a significant increase in the TAC for Atka mackerel could only be achieved by, (1) raising the BS groundfish cap, or (2) reducing the TAC for some other species by an equivalent amount.

It is unlikely the Council would undertake the former, for any number of reasons. This leaves a redistribution of the BS cap among fish species and fisheries. Until the Council makes the explicit decision as to which species TAC, or group of species TACs, it intended to reduce to accommodate the Atka mackerel increase, a quantitative estimate of this opportunity cost cannot be made. It, nonetheless, must be anticipated as a cost of a proposed action which increased the Atka mackerel TAC.

3.3 Economic Assessment of the Alternatives

3.3.1 Alternative 1: The Status Quo

Under this alternative, the AI would remain a single management unit, with one TAC for the entire subarea. The Council has indicated that, in this circumstance, it would maintain the Atka mackerel TAC for the AI at a level that was proportional to the size of the survey biomass found in the eastern half of the subarea (approximately 27%). A fisheries removal of this size, recognizing that the fishery takes place primarily in the eastern segment of the subarea, is assumed to be biologically acceptable and would minimize the risk of localized depletion.

The effect of this decision, in 1993 and beyond, is to remove the vast majority of the potentially available Atka mackerel TAC in the AI from exploitation. In 1993, as noted previously, this potential TAC could reach 117,100 mt. While it is unlikely that the entire TAC would have been taken, even without concerns about localized depletion, it is clear that under the status quo, the opportunity to harvest a larger share of that total could not be afforded the industry.

At the prevailing average exvessel price for Atka mackerel in the U.S. fishery, the total gross value of the 1992 catch was reported to be approximately $12.8 million (PacFIN, 1992). The AI accounted for approximately $12.18 million of this total.

The Council determined that, under the status quo management alternative, the 1993 Atka mackerel TAC for the AI will be limited to 32,000 mt, out of the potential 117,100 mt (a difference of 85,100 mt). In light of the preceding discussion, the cost of retaining the status quo, as measured by the foregone gross revenue to the U.S. groundfish fishing industry could be on the order of $13 to $49 million.

If, however, the price response (discussed above) was on the order of 30% to 40%, the resulting impact estimates would change significantly. At the $.80/lb assumed average weighted price, the cost to U.S. operations of retaining the status quo, with a 30% price decline, would be $20 million. At $.50/lb, average weighted product price, a price decline to $.389/lb would drive net revenues to zero.

That is, if price declined by more than 22% from an average $.50/lb base, the additional revenue from harvesting and processing the 85,100 mt TAC differential would not cover the increased cost of doing so.

As noted above, this does not automatically imply that the fishery will cease. Some boats will choose to operate so long as they are able to cover variable costs. But the fishery would produce no net benefit, under this circumstance.

To arrive at an estimate of the aggregate net cost of foregoing the potential increase in Atka mackerel TAC, across all BS groundfish fisheries, it would be necessary to deduct the "opportunity cost", or foregone revenues from fisheries for other species whose TACs were reduced to accommodate the Atka mackerel TAC increase. This is impractical, at this time, because the Council has not determined which other fisheries (nor the amounts of each) it will reduce to accommodate the Atka mackerel increase. One may infer that the Council would be unlikely to "give up" TAC in one or more fisheries to provide TAC to Atka mackerel unless the latter was at least as valuable as the former. In this case, while there would be potential economic distributional implications, the net economic result of transferring TAC from one or more other groundfish species to Atka mackerel would, at worst, be zero.

Therefore, given the earlier cited assumptions, the net cost of retaining the status quo alternative could be as high as $20.22 million in 1993. Assuming the SSC procedure and status quo conditions of the stocks, successive seasons would see this amount rise in direct proportion to the potential increase in Atka mackerel TAC, through 1997. The increase would not be expected to be linear and the price effect could be more or less significant. That is, because of the uncertainty of the size and timing of price effects at various market levels, it would not be correct to extrapolate the 1993 result in a simple linear progression through the 1997 season, when the incremental phase-in of the higher Atka mackerel ABC is completed.

3.3.2 Alternative 2

Under this alternative, the AI would be separated into two districts by dividing the region at 177°E longitude for the purpose of providing a mechanism to spatially allocate TACs.

Adoption of this proposed alternative amendment would have no directly attributable economic or socioeconomic costs. That is, because the proposed action has no management or regulatory effect beyond creating a "districting" line at 177°E longitude, its adoption by the Council carries with it no regulatory costs, other than minor changes in reporting and recordkeeping for operators of those vessels electing to operate in the new districts. Presumably, the difference in reporting costs between having two or three districts will be trivial. Because the Atka mackerel fishery and other fisheries that might be conducted in the western AI are conducted with virtually 100% observer coverage, and because observer costs are included in the estimated average daily operating costs, cited above, there are no significant cost increases anticipated in these categories. Approval of the amendment would enable future apportionments of groundfish to the western AI, given sufficient biological information for a species or species group, and might result in a greatly increased availability of some groups, as is the case for Atka mackerel. Since the total groundfish harvest is limited by the OY cap (2 million mt), allocations to the proposed new Aleutian District could either: (1) replace allocations of that species group in other areas, or (2) replace allocations to other species groups, as would be the case if the Atka mackerel TAC is increased from the non-specific operational reserve in 1993. Whether TACs for any groundfish would be apportioned within the AI in 1994 and later years depends first on the availability of stock information and other biological and ecosystem concerns, and also on market

The RFA requires that impacts of regulatory measures imposed on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions with limited resources) be examined to determine whether a substantial number of such small entities will be significantly impacted by the measures. Harvesting fishing vessels are considered to be small businesses.

The proposed amendment will establish a management mechanism by which the Council may subsequently choose to geographically apportion TAC. Adoption of this proposal, in and of itself, will have no regulatory effect, and therefore no significant impacts on small entities. The potential increase in the 1993 Atka mackerel TAC made possible by this rule is not anticipated to have a significant economic on a substantial number of small entities because that fishery has been prosecuted almost exclusively by a small number of large catcher/processors and mothership processors, with few small harvesting vessels. While creation of additional management districts, together with future allocations of groundfish TAC to those new districts, could eventually alter fishing patterns, the number and nature of participants, and the overall value realized from the total groundfish fishery, those effects are not currently predictable or quantifiable.

5.4 Finding of No Significant Impact

For the reasons discussed above, implementation of either of the alternatives to the status quo would not significantly affect the quality of the human environment, and the preparation of an environmental impact statement on the final action is not required under Section 102(2)(c) of the National Environmental Policy Act or its implementing regulations.

__________________________ ________________________
Date

6.0 REFERENCES

BANR Bill Atkinson's News Report, various issues 1991 and 1992. 5507 N.E. 58th Street, Seattle, WA 98105

Berzin, A.A. and A.A. Rovnin. 1966. Distribution and migration of whales in the northeastern part of the Pacific Ocean, Bering and Chukchi Seas. In, K. Panin (ed.), Soviet Research on Marine Mammals of the Far East, p. 103-136. Transl. USDOI, Bureau of Commercial Fisheries.

Bouchet, G.C., R.C. Ferrero, and B.J. Turnock. 1986. Estimation of the abundance of Dall's porpoise (Phocoenoides dalli) by shipboard sighting surveys. Unpubl. rpt., National Marine Mammal Laboratory. 35p.

Braham, H. 1984. The status of endangered whales: an overview. In J. W. Breiwick and H. W. Braham (eds.), The status of endangered whales. Mar. Fish. Rev. 46:1-6.

Braham, H.W. and M.E. Dahlheim. 1982. Killer Whales in Alaska Documented in the Platforms of Opportunity Program. Rep. Int. Whal. Comm. 32:643-646.

Braham, H.W., R.D. Everitt, B.D. Krogman, D.J. Rugh, and D.E. Withrow. 1977. Marine mammals of the Bering Sea: A preliminary report on distribution and abundance 1975-76. Seattle, WA: USDOC, NOAA, NMFS, Northwest and Alaska Fisheries Center, Marine Mammal Division. Proceedings Report.

Brueggeman, J. 1987. Aerial surveys of endangered cetaceans and other marine mammals in the northwestern Gulf of Alaska and southeastern Bering Sea. Rept. to MMS and NOAA; OCSEAP Research Unit 673, Contract No. 85-ABC-00093. pp. 4-73 - 4-83.

Brueggeman, J.J., R.A. Grotefendt, and A.W. Erickson. 1984. Endangered Whale Surveys of the Navarin Basin Alaska. Bellevue, WA: Envirosphere Company.

Burns, J.J., L.H. Shapiro, and F.H. Fay. 1980. The Relationships of marine mammal distributions, densities, and activities to sea ice conditions. Environmental Assessment of the Alaskan Continental Shelf, Final Reports of Principal Investigators, Vol. II, RU 248/249. Boulder, CO: USDOC, NOAA, OCSEAP, 173 p.

Byrd, G.V., J.C. Williams, and R. Walder. 1992. Status and biology of the tufted puffin in the Aleutian Islands, Alaska after a ban on salmon driftnets. USF&WS Unpublished manuscript. USF&WS, Alaska Maritime National Wildlife Refuge, Aleutian Islands Unit, PSC 486 Box 5251, FPO AP 96506-5251, Adak Alaska. 100 p.

Caldwell, D.K., M.C. Caldwell, and D.W. Rice. 1966. Behavior of the Sperm Whale, Physeter catodon L. In, K.S. Norris (ed.), Whales, dolphins, and porpoises, p. 677-617. University of California Press, Berkeley.

Calkins, D. G. 1986. Marine mammals. in: The Gulf of Alaska: Physical Environment and Biological Resources (eds. D. W. Hood and S. T. Zimmerman). USDOC, USDOI, NTIS PB87-103230. pp. 527-558.

Calkins, D. and E. Goodwin. 1988. Investigation of the declining sea lion population in the Gulf of Alaska. Unpubl. Rpt., Alaska Dep. Fish Game, 333 Raspberry Road, Anchorage. 76 p.

Crawford, T. W. 1981. Vertebrate prey of Phocoenoides dalli (Dall's porpoise) associated with the Japanese high seas salmon fishery in the North Pacific Ocean. Masters thesis, Univ. Washington. 72 pp.

Dahlheim, M.E. 1981. A review of the biology and exploitation of the killer whale, Orcinus orca, with comments on recent sightings from the Antarctic. Rep. Int. Whal. Commn. 31:541-546.

FAO Yearbook, Food and Agriculture Organization of the United Nations, Vol. 68, 1989.

Fisheries of the United States, 1991, Current Fishery Statistics No. 9100, U.S. Dept. of Commerce, NOAA, NMFS.

Frost, K.J. and L.F. Lowry. 1981. Trophic importance of some marine gadids in northern Alaska and their body-otolith-size relationships. Fishery Bulletin 79: 187-192.

Frost, K.J. and L.F. Lowry. 1986. Sizes of walleye pollock, Theragra chalcogramma, consumed by marine mammals in the Bering Sea. Fishery Bulletin 84:192-197.

Frost, K., L.F. Lowry, and J.J. Burns. 1982. Distribution of Marine Mammals in the Coastal Zone of the Bering Sea During Summer and Autumn. Environmental Assessment of the Alaskan Continental Shelf, Final Reports of Principal Investigators, RU 613. Boulder, CO: USDOC, NOAA, OCSEAP, 188 p.

Gorbunova, N.N. 1962. Razmnozhenie i razvite ryb semeistva terpugovykh (Hexagrammidae) (Spawning and development of greenlings (family Hexagrammidae)). Tr. Inst. Okeanol., Akad. Nauk SSSR 59:118-182. In Russian. (Trans. by Isr. Program Sci. Trans., 1970, p. 121-185 in T.S. Rass (editor), Greenlings: taxonomy, biology, interoceanic transplantation; available from the U.S. Dep. Commer., Natl. Tech. Inf. Serv., Springfield, VA., as TT 69-55097).

Hameedi, M.J., (ed). 1981. Environmental Assessment of the Alaskan Continental Shelf. Proceedings of a Synthesis Meeting: The St. George Basin Environment and Possible Consequences of Planned Offshore Oil and Gas Development, Anchorage, Alaska, April 28-30, 1981. Juneau, AK: USDOC, NOAA, OCSEAP.

Heyning, J.E. and M.E. Dahlheim. 1988. Orcinus orca. Mammalian Species Account, No. 304, p. 1-9, 4 figures.

Hollowed, A.B., B.A. Megrey, P. Munro, and W. Karp. 1991. Walleye Pollock. In Stock Assessment and Fishery Evaluation Report for the 1992 Gulf of Alaska Groundfish Fishery. NPFMC PO Box 103136, Anchorage AK 99510.

Jones, L.L., D.W. Rice, and M. Gosho. 1985. Biological studies on Dall's porpoise: Progress Report. Document submitted to International North Pacific Fisheries Commission.

Kajimura, H. 1984. Opportunistic Feeding of the Northern Fur Seal, Callorhinus ursinus, in the Eastern North Pacific Ocean and Eastern Bering Sea. NOAA Tech. Rep., NMFS SSRF-779.

Kajimura, H., and T.R. Loughlin. 1988. Marine mammals in the oceanic food web of the eastern subarctic Pacific. Bull. Ocean Res. Instit., Japan.

Kenyon, K.W. and D.W. Rice. 1961. Abundance and Distribution of the Steller Sea Lion. Journal of Mammalogy, Vol. 42, No. 2, p. 223-234.

Kimura D.K. and L.L. Ronholt. 1988. In R.G. Bakkala (editor), Condition of groundfish resources of the eastern Bering Sea and Aleutian Islands region in 1987, p. 143-171. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-139.

Leatherwood, S. A. Bowles, and R. Reeves. 1983. Endangered whales of the eastern Bering Sea and Shelikof Strait, Alaska; results of aerial surveys, April 1982 through April 1983 with notes on other marine mammal behavior. H/SWRI Tech. Rep. No. 83-159/December. pp. 173-182.

Levada, T.P. 1979. Comparative morphological study of Atka mackerel. Pac. Sci. Res. Inst. Fish. Oceanogr. (TINRO), Vladivostok, U.S.S.R., Unpublished manuscript.

Lowe, Sandra A. 1992. Atka Mackerel. In Stock Assessment and Evaluation Report for the

Groundfish Resources of the Bering Sea/Aleutian Islands Regions as Projected for 1993. North Pacific Fisheries Management Council, P.O. Box 103136, Anchorage, Alaska, 99510.

Lowry, L.F., K. J. Frost and J. J. Burns. 1986. Assessment of marine mammal-fishery interactions in the western Gulf of Alaska and Bering Sea: consumption of commercially important fishes by Bering Sea pinnipeds. Final Rept. to NMFS, Contract No. NA-85-ABH-00029. 26 pp.

Lowry, L.F., K.J. Frost, D.G. Calkins, G.L. Swartzman, and S. Hills, 1982. Feeding Habits, Food Requirements, and Status of Bering Sea Marine Mammals. North Pacific Fishery Management Council, Document 19, Anchorage, Alaska.

Lowry, L. F., K. J. Frost, and T. R. Loughlin. 1989. Importance of walleye pollock in the diets of marine mammals in the Gulf of Alaska and Bering Sea, and implications for fishery management. In Proceedings of the international symposium on the biology and management of walleye pollock, November 14-16, 1988, Anchorage, AK. p. 701-728. Alaska Sea Grant Rpt. No. 89-1.

Lowry, L.F., R.R. Nelson and K.J. Frost. 1987. Observations of killer whales, Orcinus orca, in western Alaska: Sightings, strandings, and predation of other marine mammals. Can. field-Naturalist 101:6-12.

Merrick, R.L., T.R. Loughlin, and D.G. Calkins. 1987. Decline in abundance of the northern sea lion, Eumetopias jubatus, in Alaska, 1956-1986. Fishery Bulletin 85:351-365.

Merrick, R.L., D. G. Calkins, and D. C. McAlister. 1992. Aerial and ship-based surveys of Steller sea lions (*Eumetopias jubatus*) in southeast Alaska, Gulf of Alaska, and Aleutian Islands during June and July 1991. U. S. Dep. Commer. NOAA Tech. Memo. NMFS-AFSC-1, 41 p.

Mitchell, E. 1975. Trophic Relationships and competition for Food in Northwest Atlantic Whales. In: Proceedings of the Canadian Society of Zoology Annual Meeting, June 2-5, 1974, M.D.B. Burt, ed., p. 123-133

Morris, B.F. 1981. An Assessment of the Living Marine Resources of the Central Bering Sea and Potential Resource Use Conflicts Between Commercial fisheries and Petroleum Development in the Navarin Basin, Proposed Sale No. 83. Anchorage, AK: USDOC, NOAA, NMFS, Environmental Assessment Division.

Morris, B.F., M.S. Alton, and H.W. Braham. 1983. Living Marine Resources of the Gulf of Alaska: A Resource Assessment for the Gulf of Alaska/Cook Inlet Proposed Oil and Gas Lease Sale 88.. Seattle, WA: USDOC, NOAA, NMFS.

Nasu, K. 1974. Movements of Baleen Whales in Relation to Hydrographic Conditions in the Northern Part of the North Pacific and the Bering Sea. In: Oceanography of the Bering Sea, D.W. Hood and E.J. Kelly, eds., p. 345-361.

Neave, D. and B. Wright. 1969. Observations of Phocoena phocoena in the Bay of Fundy. Journal of Mammalogy, Vol. 50, p. 653-654.

Nishiwaki, N. and N. Oguru. 1971. Baird's beaked whales caught on the coast of Japan in recent 10 years. Sci. Rep. Whales Res. Inst. 23: 111-122.

National Marine Fisheries Service (NMFS). 1993. Final Environmental Assessment for 1993 Groundfish Total Allowable Catch Specifications. NMFS, PO Box 21668, Juneau, AK 99802-1668.

North Pacific Fisheries Management Council. 1979. Fisheries Management Plan for the Groundfish Fishery in the Bering Sea/Aleutian Island Area. North Pacific Fisheries Management Council, P.O. Box 103136, Anchorage, Alaska, 99510.

North Pacific Fisheries Management Council. 1987. Resource Assessment Document for the Bering Sea-Aleutians as Assessed in 1987 and Estimated Acceptable Biological Catch Levels for 1988. North Pacific Fisheries Management Council, P.O. Box 103136, Anchorage, Alaska, 99510.

Perez, M.A. and M.A. Bigg. 1986. Diet of northern fur seals, Callorhinus ursinus, off western North America. Fish. Bull. USA 84:957-971.

Perez M. A. and W. B. McAlister. 1988. Estimates of food consumption by marine mammals in the eastern Bering Sea ecosystem. NMFS, NMML unpublished report.

Pitcher, K.W. 1980a. Food of the harbor seal, Phoca vitulina richardsi, in the Gulf of Alaska. Fishery Bulletin 78:544-549.

Pitcher, K.W. 1980a. Stomach contents and feces as indicators of harbor seal, Phoca vitulina, foods in the Gulf of Alaska. Fishery Bulletin 78: 797-798.

Pitcher, K. W. 1981. Prey of Steller sea lion, Eumetopias jubatus, in the Gulf of Alaska. Fishery Bulletin 79: 467-472.

Pitcher, K.W. 1989. Major decline in number of harbor seals, Phoca vitulina richardsi, on Tugidak Island, Gulf of Alaska. Mar. Mamm. Sci. 6:121-134.

Swartzman, G.L. and R. T. Haar. 1983. Interactions between fur seal populations and fisheries in the Bering Sea. Fishery Bulletin 81: 121-132.

Swartzman, G.L. and R. J. Hofman. 1991. Uncertainties and research needs regarding the Bering Sea and Antarctic Marine Ecosystems. Marine Mammal Commission Rept. PB91-201731. 110 p.

Tomilin, A.G. 1957. Mammals of the U.S.S.R and Adjacent Countries, Vol. 9, Cetacea (in Russia). Moscow: Isdatel'stvo Akademii Nauk SSR. Transplanted by Israel Program for Scientific Translation, 1967. 717 p. Available ad TT65-50086 at USDOC, NTIS, Springfield, Virginia.
Sept. 1979.)

Turnock, B.J. 1987. Analysis of experiments to assess movement of Dall's porpoises in relation to survey vessels and population estimates corrected for movement and visibility bias for the North Pacific Ocean. Document submitted to the Scientific Subcommittee, Ad Hoc Committee on Marine Mammals, international North Pacific Fisheries Commission, March 10-14, 1987.

United States Fish and Wildlife Service (USFWS). 1989. Formal Consultation with the U.S. Fish

and Wildlife Service Pursuant to Section 7 of the Endangered Species Act. Biological Opinion. July 3, 1989. National Marine Fisheries Service, PO Box 21668, Juneau, Ak 99802-1668.

United States Fish and Wildlife Service (USFWS). 1993. Informal Consultation with the U.S. Fish and Wildlife Service Pursuant to Section 7 of the Endangered Species Act. February 1, 1993. National Marine Fisheries Service, PO Box 21668, Juneau, AK 99802-1668.

Wespested, V. and P. Dawson. 1991. Walleye Pollock. In Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Island Region as projected for 1992. NPFMC PO Box 103136, Anchorage, AK 99510.

Wespested, V. and P. Dawson. 1992. Walleye Pollock. In Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Island Region as projected for 1993. NPFMC PO Box 103136, Anchorage, AK 99510.

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APPENDIX IV

A Demonstration that

the Equity of the North Pacific Fisheries Research Plan Fees

will be the same if the Fees are Assessed against

Fishermen, Processors, or Both

A DEMONSTRATION THAT THE EQUITY OF THE NORTH PACIFIC FISHERIES RESEARCH PLAN FEES WILL BE THE SAME IF THE FEES ARE ASSESSED AGAINST FISHERMEN, PROCESSORS, OR BOTH

The concepts of supply and demand can be used to demonstrate that a per unit raw fish fee levied on fishermen or processors will have the same effects on the equilibrium quantity of fish, the prices net of the fee received by fishermen, and the price including the fee paid by processors.

The supply curve depicts the quantity of fish that fishermen will supply at each price and the demand curve depicts the quantity that processors will demand (i.e., be willing to buy) at each price. The equilibrium (i.e., market clearing) price and quantity are given by the intersection of the supply and demand curves. In Figure 1, S is the supply curve, D is the demand curve, $1.00 is the equilibrium price, and 100,000 metric tons (t) is the equilibrium quantity.

If a fee of $0.10 per pound of fish is collected from fishermen, there would be a $0.10 vertical upward shift in the supply curve (see Figure 2). For example, fishermen would supply the initial equilibrium quantity of 100,000 t only if the price they receive is $1.10 and their price net of the fee is still $1.00. The shift in the supply curve results in a new equilibrium price and quantity of $1.06 and 90,000 t. The new equilibrium price includes the $0.10 fee. Therefore, processors are paying $1.06 for fish and fishermen are receiving $0.96 after paying the $0.10 fee. In this example, the price paid by processors increases by $0.06 and the net price received by fishermen decreases by $0.04.

If a fee of $0.10 per pound of fish is collected from processors, there would be a $0.10 vertical downward shift in the demand curve (see figure 3). For example, processors would demand 90,000 t if the price they pay fishermen is $0.96 because the total price they pay including the fee is $1.06. This shift in the demand curve results in the same new equilibrium. The equilibrium quantity is 90,000 t, the price that fishermen receive is $0.96 and the price the processors pay including the $0.10 fee is $1.06. The price paid by processors including the fee increases by $0.06 and the price received by fishermen decreases by $0.04. Therefore the results are the same whether the fee is collected from the fishermen or the processors.

Since the results are the same whether the $0.10 fee is collected from processors or fishermen, the results would also be the same if any part of the fee is collected from processors and the rest is collected from fishermen.

The increase in what processors pay and the decrease in what fishermen receive per pound of fish will depend on the slopes and positions of the supply and demand curves. If, in this example of a $0.10 per pound fee, the supply curve had been vertical (perfectly inelastic) or if the demand curve had been horizontal (perfectly elastic), the price fishermen receive would have decreased by $0.10 and there would have been no change in the price paid by processors. However, if the supply curve had been horizontal (perfectly elastic) or if the demand curve had been vertical (perfectly inelastic), the price fishermen receive would not have changed and there would have been a $0.10 increase in the price paid by processors. These extreme cases in which either the price received by fishermen decreases by the full amount of the fee or the price paid by processors increases by that amount are dependent on nature of supply and demand curves; they are not dependent on whether the processors, fishermen, or both are assessed a fee that totals $0.10 per pound.

In these examples the equilibrium price and quantity are determined by the supply and demand curves and the distribution of the burden of a fee is determined by the market positions of fishermen and processors as represented by the supply and demand curves. For some market structures the concept of a supply curve or a demand curve is not relevant. However, in such situations, the market positions of the fishermen and the processors, not the point of collection, again determine the effect of a fee.

Figure 1 Equilibrium Without Fees

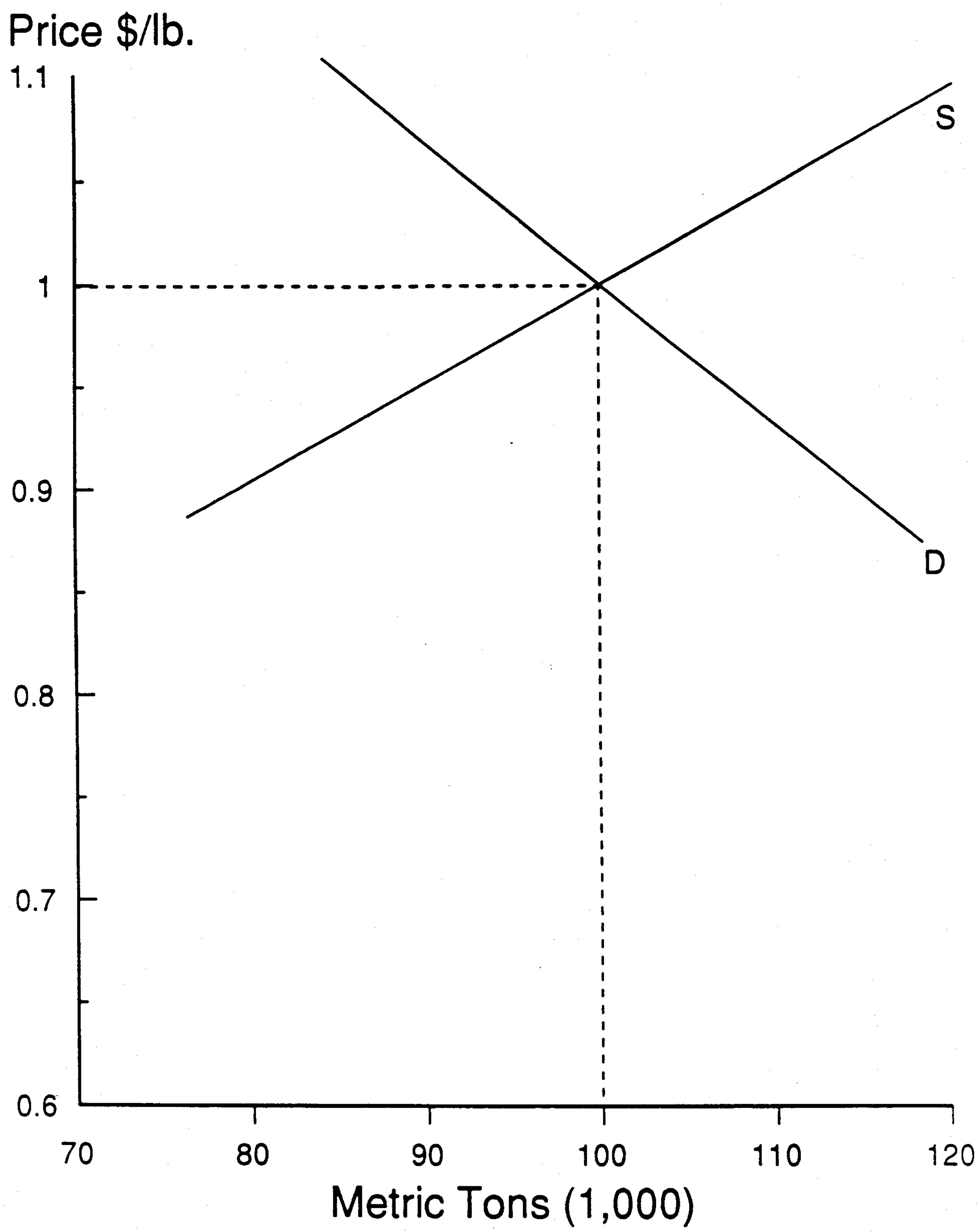


Figure 2 Equilibrium With A Fee Collected From Fishermen

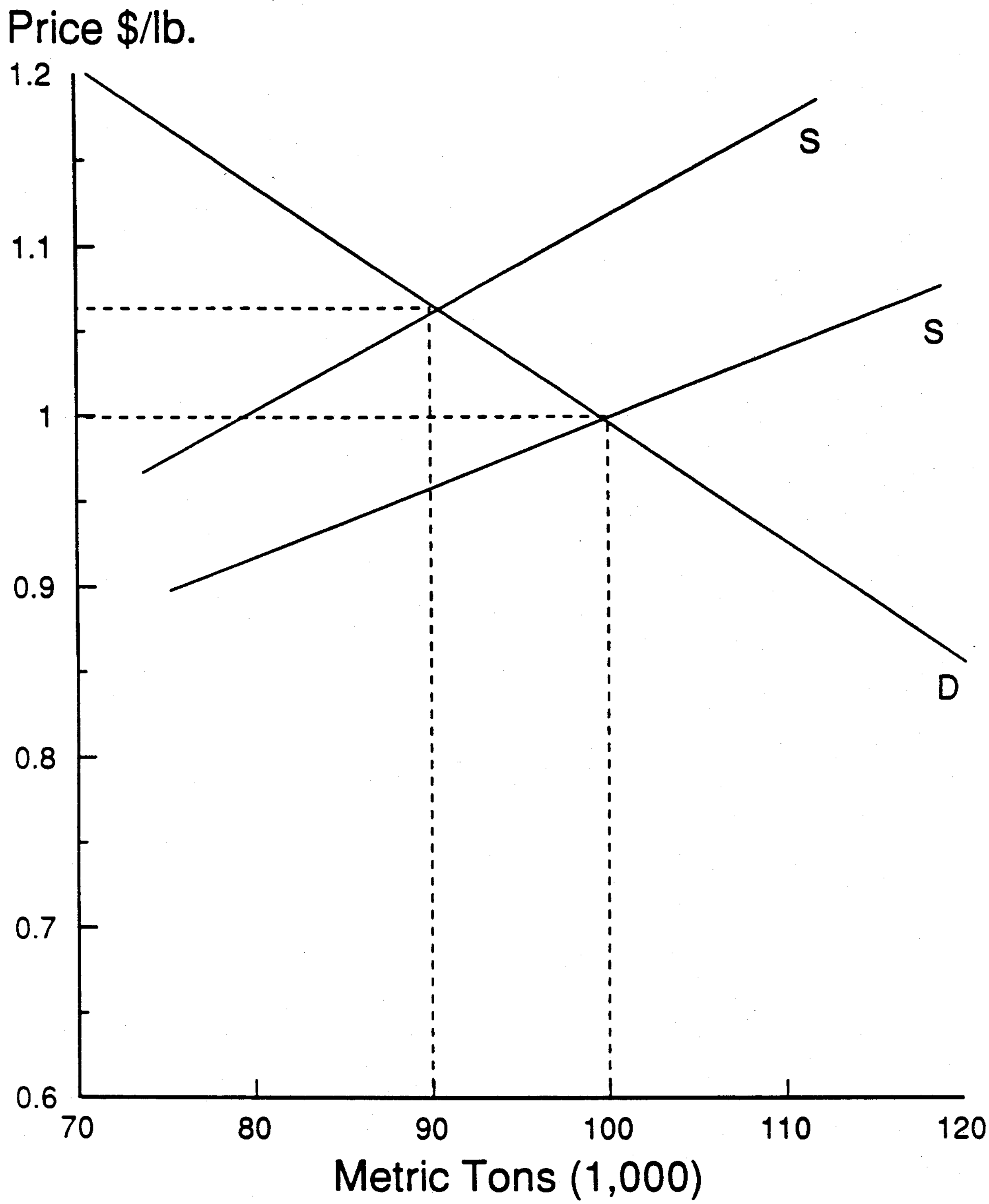
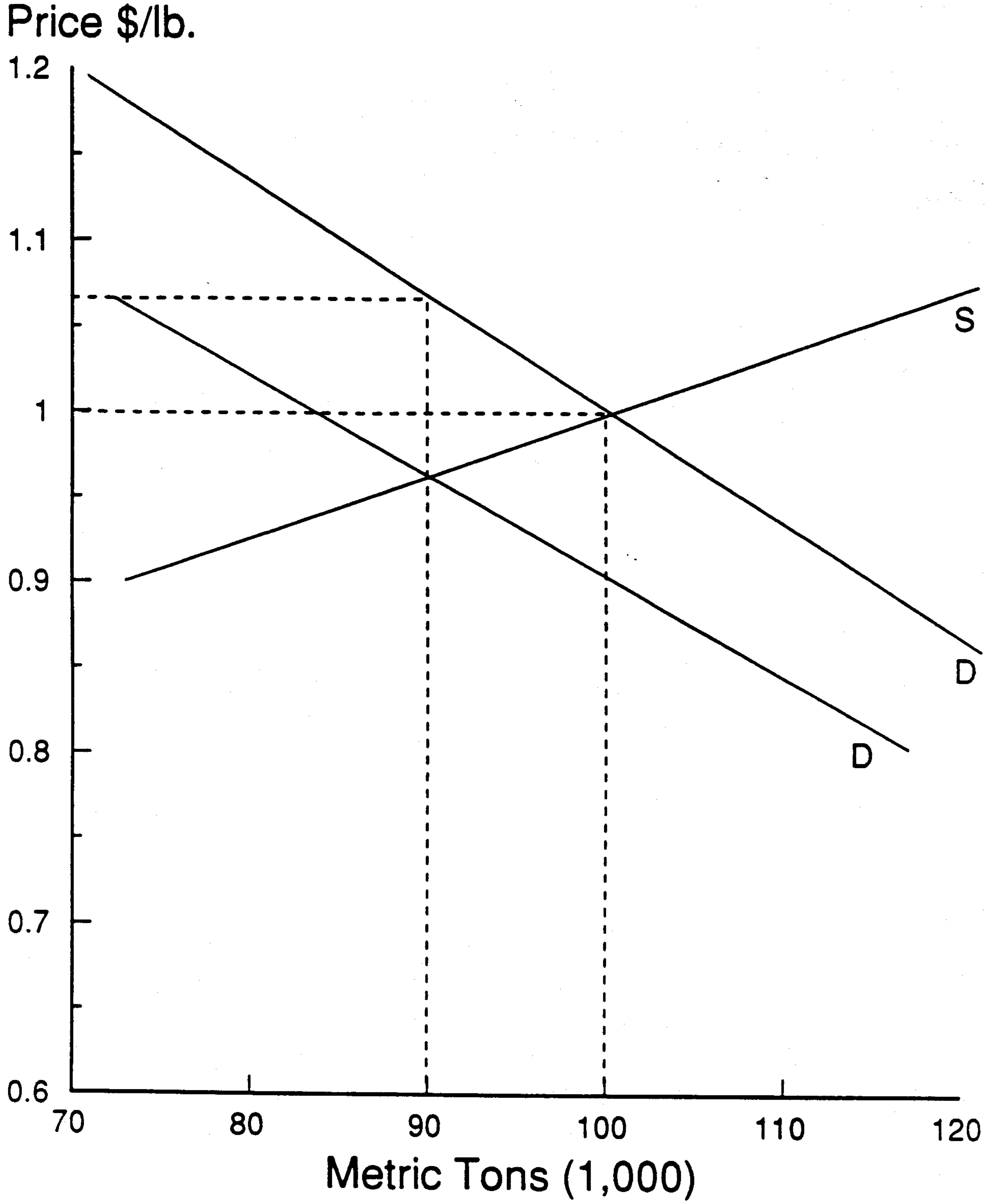


Figure 3 Equilibrium With A Fee Collected From Processors



A COMPARISON OF CATCHER-PROCESSOR VESSEL AND CATCHER VESSEL FISHING PERFORMANCE IN THE 1989 BERING SEA RED KING CRAB FISHERY

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Abstract

This report is the third in a series, evaluating differences in catch rates between catcher processors and catcher vessels in the Bering Sea red king crab fishery. During the 1988 and 1989 Bristol Bay red king crab fishery, on-board observers were placed on catcher-processor vessels. In the 1989 fishery, the average pounds landed per catcher vessel was approximately 59,000 compared with an average of approximately 72,000 for the catcher-processor vessels when comparisons of vessels of similar sizes were made (130 ft-170 ft). The landing rate was 47 pounds per pot-lift versus 56 pounds per pot-lift respectively. In 1989 as in 1988, the pounds landed per pot-lift, and pounds landed per number of registered pots by catcher-processor vessels were not significantly larger than the catcher vessels but differences in these rates were highly significant in 1987. We conclude that the observer program which was instituted in the 1988 and 1989 fishery remains the primary factor contributing to the similarity in the catch per unit effort reported by the catcher fleet and the catcher-processor fleet. There does appear to be a shift in CPUE between the past two years, although not statistically significant. Continued vigilance is warranted to insure that observers remain effective in deterring undersized processing.

Introduction

This report is a continuation of previous examinations of the differences in catch rates observed between catcher-processor vessels and catcher vessels participating in the Bristol Bay red king crab fishery. The previous reports, hereafter referred to as the 1987 Report or the 1988 Report[2], addressed differences between the 1987 and 1988 fisheries. This observer program was first implemented during the 1988 Bristol Bay red king crab fishery. The differences in catch rates reported in the 1987 Report was one of the factors considered by the Board of Fisheries in establishing the mandatory observer program. This report addresses the catch rates observed between the catcher-processor fleet and the catcher fleet during the 1989 fishery and compares these results with the 1988 Report.

The number of catcher-processor vessels that participated in recent Bristol Bay red king crab fishery was similar to the previous year with 18 participating catcher-processor vessels in 1989 as compared with 20 in 1988.

This report examines apparent differences in catch rates between the catcher-processor vessels and catcher vessels in the 1989 fishery. Because of the high number of observers that were decertified, the effectiveness of the program as a deterrence to processing sub-legal animals has been questioned. The vessel size, the number of pots registered. and the number of pots lifted are examined in this report, similar to the 1988 Report. Because of the area manager's observation of potentially more pots being fished by catcher-processor vessels, and consequently, increased soak times, we have examined the number of pot-lifts closer by comparing them with the number of pots registered. The use of numbers of pots registered provides an alternative method of examining the effective amount of effort of a given vessel and coupled with pot-lift data, soak time effects on catch per unit effort (CPUE) can be evaluated. Catch per unit effort was projected by using the reported number of pot-lifts and the number of pots registered as the effort.

Therefore, the objective of this analysis is to determine if the pounds landed and the CPUE were significantly different for the catcher-processor vessels in the fishery held during September 1989 and to determine if on-board observers remained effective. If CPUE differences occurred, we examined if these differences can be explained by known differences between the two types of vessels or changes in soak time.

Methods

The methods used are the same as those reported in the 1988 Report. The data used in this analysis were obtained from the fish tickets and vessel registration forms. For catcher-processor vessels, a single fish ticket was usually submitted for the entire season, although on

[2]Schmidt, D. and B. A. Johnson. 1988. A Comparison of Catcher-Processor and Catcher Vessel Fishing Performance in the 1987 Bering Sea Red King Crab Fishery. Regional Information Report No. 4K88-14. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.
Schmidt, D. and B. A. Johnson. 1989. A Comparison of Catcher-Processor and Catcher Vessel Fishing Performance in the 1988 Bering Sea Red King Crab Fishery. Regional Information Report No. 4K89-1. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

longer fisheries, a fish ticket is completed weekly. For catcher vessels, a ticket is completed at each landing. The basic data from the fish tickets consisted of pounds landed, number of crab landed, and number of pot-lifts. The basic data from the vessel registration forms consisted of numbers of pots registered and length of vessel. The data resolution is that of vessel, i.e. multiple fish tickets were combined for a single vessel.

For testing differences in means we used the non-parametric test that was used in the 1987 and 1988 Reports. The test used in known as the Mann-Whitney or Wilcoxon rank sum test (Conover 1980).

A graphical method was used to locate differences in the sampling distributions of these data. The quantile-quantile plot or Q-Q plot (Chambers et al. 1983, Hoaglin et al. 1983, and Gnanadesikan 1977) can be used to determine if a sample distribution is similar to some other distribution. The analysis of distributional differences was necessary because we could easily have had a segment of the catcher-processor fleet that landed crab at normal or sub-normal rates, while another segment of the catcher-processor fleet that experienced very high landing rates. Differences in means may be very minor in this case, but distributional differences could be very large. Because the distributional patterns did not show any patterns not observed in the 1988 and 1987 Reports, the plots were not included in this report.

Results

Comparisons of Pounds Landed and CPUE for 1989

All mean values for each variable except the pounds per pot-lift and pounds per pot registered were significantly greater for the catcher-processor vessels as indicated by the test statistics (Table 1). This is identical with the 1988 fishery data.

Table 1.— Test statistics for difference in mean values between catcher-processor vessel (N=18) and catcher vessel (N=193).

Variable	Mean values: Catcher vessel	Mean values: Catcher-processor vessel	Ratio of means	P-value Wilcoxon test
Pounds landed	46276	74085	1.60	<0.01
Number of pot-lifts	957	1296	1.35	<0.01
Pounds per pot-lift	50.0	55.0	1.10	0.10
Number of pots registered	248	388	1.56	<0.01
Pounds per pots registered	187.1	189.4	1.01	0.45
Vessel length (ft)	100	161	1.60	<0.01

Examination of the Q-Q plot CPUE data for the entire data set or for the subset of data reflecting vessels in the 130 ft-170 ft category, did not suggest any trends not observable from the tabular data. Therefore the plots are not presented in this report.

Although the difference in average pounds landed between the two vessel types is significant ($P<0.01$), the pounds landed may be affected by the number of pot-lifts or the size of vessel. As an alternative measure of effort, registered number of pots was also used as a comparative basis. For both measures of CPUE, the catcher-processor vessels did not have significantly different values when compared to the catcher vessels (Table 1). Note that the P-value for pounds per pot-lift is 0.10 as compared with 0.38 the previous year for the same parameter. This value is not considered significant using the $P=0.05$ criteria.

As in previous years, we further examined the data to determine if length of vessel would explain the differences observed. To provide similar size classes of both catcher-processor and catcher vessels, vessels of 130–170 feet were selected, identical to the procedures used in 1987 and 1988. This group included 10 catcher-processor vessels and 19 catcher vessels. This grouping provided sufficient numbers of vessels and low significant difference of length ($P=0.03$) (Table 2).

Table 2.— Test statistics for difference in mean values between catcher-processor vessel ($N=10$) and catcher vessel ($N=19$) with length between 130 ft and 170 ft.

	Mean values			
Variable	Catcher vessel	Catcher-processor vessel	Ratio of means	P-value Wilcoxon test
Pounds landed	59392	71917	1.21	0.34
Number of pot-lifts	1305	1209	0.93	0.19
Pounds per pot-lift	47.0	56.1	1.19	0.18
Number of pots registered	332	391	1.18	0.04
Pounds per pots registered	176.0	180.9	1.03	0.48
Vessel length (ft)	152	159	1.05	0.03

For vessels of size 130–170 feet in length, there was not a statistical difference between mean pounds landed, contrary to the observations of 1988. Neither measure of CPUE shows a statistical difference between catcher-processor vessels and catcher vessels as would be expected from the previous examination of the full fleet (Table 2). The number of pot-lifts are not significantly different for the catcher-processor vessels, also differing from the 1988 fishery.

Comparisons of 1987, 1988 and 1989 Fisheries

We have analyzed the 1989 Bering Sea red king crab fish ticket data in an attempt to determine if a disparity existed in pounds landed per unit effort between the catcher vessels and the catcher-processor vessels. If a disparity exists, two possible explanations are possible. Illegal catch could be one explanation, because of the high number of observers which were decertified during 1989. This suggests that their ability to act as deterrents to sub-legal processing may have been compromised. Increased soak times is one other possible explanation suggested by ADF&G management staff. This should be detectable as a discrepancy between the pounds landed per pot-lift, and the pounds landed per pot registered.

Table 3 tabulates the differences in the catch values between 1987, 1988 and 1989 for both vessel types between 130 and 170 ft in keel length. The pounds landed by the catcher-processor vessels in 1989 were approximately 1.2 times higher than the catcher vessels, when considering vessels of similar length. This compares with 2.5 times higher in 1987 and 1.3 times in 1988. It is a safe assumption that the pounds landed are relatively free from reporting errors. When comparing the vessels in total, the catcher-processor vessels had landings that were 1.6 times larger that of the catcher vessels in 1989 versus 2.3 times larger in 1987, and 1.4 times in 1988.

Table 3.— 1987, 1988 and 1989 mean values for catcher-processor vessel and catcher vessel with length between 130 ft and 170 ft.

	Catcher vessels			Catcher-processor vessels			Ratios		
Variable	1987	1988	1989	1987	1988	1989	1987	1988	1989
Pounds landed	54844	40131	59392	136074	53817	71917	2.48	1.34	1.21
Number of pot-lifts	1013	795	1305	1396	1043	1209	1.37	1.31	.93
Pounds per pot-lift	58.5	54.4	47.0	92.4	50.9	56.1	1.58	0.94	1.19
Number of pots registered	300	316	332	398	410	391	1.32	1.30	1.18
Pounds per pots registered	183.0	126.9	176.0	330.3	132.4	180.9	1.80	1.04	1.03
Vessel length (ft)	152	155	152	155	158	159	1.01	1.05	1.05

Note in Table 2 that there was not a significant difference in pots lifted between vessels for 1989 but a significant difference in the numbers of pots registered. Assuming all registered pots were fished, longer soak times would have occurred. Although CPUE values were not significant between vessel types, the change in CPUE expressed as pounds per pot from the 1988 data, may be explained by longer soak times reflecting nearly identical pounds per pot registered during 1988 and 1989. Note also that the differences from 1987 are still quite large, reflecting the continued effectiveness of on-board observers in providing similar CPUE values between vessels of similar size, regardless of processing modes.

Discussion

Analysis of vessels of all lengths indicates that catcher-processor vessels had average pounds landed per pot-lift higher than that of an average catcher vessel but not significant. When the vessels compared were vessels of similar keel lengths, average pounds landed per pot-lift by catcher-processor vessels was again not significantly different than that reported by the catcher vessels.

When compared with 1988, the mean 1989 CPUE expressed as pounds per pot-lift increased. However the catch per pot registered stayed essentially the same. Since the number of pot-lifts reported by catcher-processor vessels dropped in 1989, the differences in CPUE observed can be explained by increased soak time. When compared with 1987, the effectiveness of the on-board observers remains obvious.

From the previous discussion, it appears that parity in the fleet has been maintained in 1989 by the presence of mandatory observers on the catcher-processor vessels. Changes in CPUE values expressed as pounds per pot-lift were not paralleled when CPUE was expressed as pounds per pot registered. Since pot-lifts dropped in the catcher-processor fleet, when compared with the equivalent sized catcher fleet, increased soak time may be a primary cause of the difference. The economic advantage of catcher-processor vessels, beyond the processing capabilities, previously explained by the increased number of pot-lifts in 1988, is now explainable by increased soak time of the number of pots registered. However, the difference in average pounds landed between the vessel types was not statistically significant in 1989. Equivalent sized vessels, based on total number of pounds landed in 1989, actually caught crab at a lesser rate in 1989 (1.21 differential) than in 1988 (1.34). If comparative increased CPUE from catcher-processor vessels were in part, caused by lack of observer diligence, the amount is too small to be detected by the analysis presented here.

Conclusions

We examined the pounds landed as a function of the number of vessels, the number of pot-lifts, and the number of pots registered to determine if significant differences occurred. With an on-board observer the pounds landed for catcher-processor vessels was larger than catcher vessels but not significantly larger in 1989. Both 1989 and 1988 rate of landings contrast sharply with 1987 data. Our conclusions have not changed since the 1988 report. To provide equal enforcement of size and sex regulations established for this fishery it is essential that a mandatory on-board observer program continue. The costs of continuing this program are very small when compared with the potential value of illegal crab taken by unobserved processing vessels.

Literature Cited

Chambers, J. M., W. S. Cleveland, B. Kleiner, and P. A. Tukey. 1983. Graphical methods for data analysis. Wadsworth, California.

Conover, W. J. 1980. Practical nonparametric statistics. John Wiley, New York.

Hoaglin, D. C., F. Mosteller, and J. W. Tukey. 1983. Understanding robust and exploratory data analysis. John Wiley, New York.

Gnanadesikan, R. 1977. Methods for statistical data analysis of multivariate observations. John Wiley, New York.

DRAFT FOR SECRETARIAL REVIEW

APPENDIX 1

ENVIRONMENTAL ASSESSMENT/REGULATORY IMPACT REVIEW/

INITIAL REGULATORY FLEXIBILITY ANALYSIS

FOR THE

NORTH PACIFIC FISHERIES RESEARCH PLAN

AMENDMENT 27 FOR THE BERING SEA ALEUTIAN ISLANDS FMP

AMENDMENT 30 FOR THE GULF OF ALASKA FMP

AMENDMENT 3 FOR THE BERING SEA

KING AND TANNER CRAB FMP

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1.0 INTRODUCTION

Section 313 of the Magnuson Fishery Conservation and Management Act authorizes the North Pacific Fishery Management Council (Council) to prepare, in consultation with the Secretary of Commerce (Secretary), a North Pacific Fisheries Research Plan (plan) for all fisheries under the Council's jurisdiction except salmon. The plan requires observers to be stationed on fishing vessels and on fish processors as appropriate to collect data necessary for the conservation, management, and scientific understanding of any fisheries under the Council's jurisdiction, including halibut, but excluding salmon. The plan also establishes a system of fees to pay for the costs of implementing the plan.

The plan is designed to gather reliable data, be fair and equitable to all vessels and processors, be consistent with applicable provisions of the law, and consider the operating requirements of the fisheries and the safety of observers and fishermen. Fees collected under the plan are limited in amount and their use and must be deposited in the North Pacific Fishery Observer Fund.

The plan also may establish a risk sharing pool to provide coverage for vessels and owners against liability from civil suits by observers. This pool, if proven feasible, must be established unless the Secretary determines that alternative comprehensive commercial insurance is available that will provide greater coverage at a lower cost to each participant.

This plan was developed in 1991 and 1992 by the Council working closely with industry, the National Marine Fisheries Service (NMFS) and, Alaska Department of Fish & Game (ADF&G). It incorporates provisions of the Observer Plan developed for the groundfish fisheries in 1989 and implemented in 1990 and 1991, and revised to comply with Section 313. Provisions of the State of Alaska's observer program for crab are also incorporated into this plan.

1.1 Description and Need for the Action

On November 1, 1989 the Secretary approved Amendments 13 and 18 to the groundfish fishery management plans for the Bering Sea/Aleutian Islands and the Gulf of Alaska. The implementing regulations were published as a final rule on December 6, 1989 (54 FR 50386). One measure authorized a comprehensive domestic fishery observer program. An Observer Plan to implement the program was prepared by the Secretary in consultation with the Council and implemented by NOAA, effective February 7, 1990 (55 FR 4839, February 12, 1990). In December 1990 the Council recommended changes to the Observer Plan which were approved by the Secretary and published as a final rule on July 8, 1991 (56 FR 30874).

The 1990 and 1991 Observer Plans required specific levels of observer coverage which varied with size of fishing vessel and quantity of fish processed by floating and shoreside processors. These requirements were established because it was recognized that living marine resources could not be effectively managed without the types of information that were either available only or most efficiently through an observer program.

The Observer Plans required that owners and operators of vessels and shoreside processing facilities participating in the groundfish fishery arrange for and pay for the cost of placing observers aboard their vessels and at their shoreside processing facilities beginning in January, 1990. The Observer Plans imposed responsibilities on NMFS, vessel operators, managers of shoreside processing facilities, and NMFS certified contractors who provide observers to groundfish fishing vessels and shoreside processors. The Observer Plans also prescribed observer conduct, conflict of interest standards for observers and contractors, and reasons for revoking contractor or observer certification. The 1991 Observer Plan changed observer requirements for shoreside processing facilities and for mothership processor vessels, authorized the release of observer-estimated bycatch rates as public information, and extended the certification time for observer contractors.

Each vessel or processor required to have observer coverage is responsible for the cost of obtaining the required observers from a certified contractor. The cost averaged between $5,800 and $7,100 per observer month in 1991. Three problems have been identified for this method of paying for observer coverage. It may not be equitable, it limits the ability of the NMFS to effectively manage the observer program, and it may result in a conflict of interest that could reduce the credibility of observer data.

It is considered by many to be inequitable because some groundfish operations are required to pay for 100% observer coverage, others are required to pay for 30% coverage, and other operations which benefit from the observer program pay none of the cost of observer coverage. The last group includes groundfish operations with no observer coverage requirements and, for example, crab and halibut operations. The cost paid by an operation is not dependent on either the benefits it receives from the observer coverage or its ability to pay for observer coverage.

This method of paying for observers also limits the level of control NMFS has over the observer program and thus its ability to effectively manage the program. The certified contractors are not solely responsible to NMFS for the quality of their work performance: they have split and sometimes conflicting concerns between their clients to which they are providing observers and their responsibilities to NMFS.

Finally, the current method of paying for observer coverage results in a potential conflict of interest between the certified observer contractors and their observers and the owners of vessels and processing plants to which observers are provided. The owners and operators of vessels and processing plants now have the responsibility for making arrangements with a certified observer contractor of their choice to meet observer requirements and for paying the costs of the observer directly to that contractor. This direct business relationship and the ability of an operation to select among the group of certified contractors mean that each contractor and, indirectly, the observers are in practice working for the operations they are observing. This provides an effective way for an operation to reward or penalize contractors and their observers and thus control the work performance of the observer and quality of data collected.

The three problems were discussed during the development of the domestic observer program. However, there was no alternative method available for paying for observer coverage, such as that used for the foreign observer program. It was determined that an observer program with broad coverage and these problems was preferable to the very limited coverage that otherwise would have been possible.

Many representatives of the fishing industry have voiced their support of the federal observer program and a more fair and equitable approach for funding that enables the NMFS to more effectively manage the observer program and eliminates a potential conflict of interest. Industry support for such a change is demonstrated by the willingness and ability of the industry to convince Congress and the President to amend the Act to allow the North Pacific Fisheries Research Plan to be established and paid for by a broad-based system of user fees.

In April 1988, the Alaska Board of Fisheries adopted regulations requiring onboard observers for all vessels that process king crab and C. bairdi Tanner crab in the waters off Alaska. In 1990, this was expanded to include C. opilio Snow crab. The Mandatory Observer Program was adopted after the Board received ADF&G staff reports that indicated there was a large discrepancy between the harvests of catcher only vessels and catcher/processors/floating processors. The Board concluded that the only way that the catches could differ so greatly was due to the processing of sub-legal crabs.

The North Pacific Fisheries Research Plan will supersede or integrate provisions from the 1991 Observer Plan and may incorporate the State of Alaska shellfish observer program. The Research Plan will replace the current Observer Plan and the Fishery Management Plans (FMPs) will be amended to reference the provisions of the Research Plan concerning observer requirements in the groundfish and crab fisheries.

The Research Plan also provides for the establishment of an Observer Oversight Committee to provide advice to the Council and the Regional Director of NMFS on general provisions of the observer and fee portions of the North Pacific Fisheries Research Plan. This committee shall review reports and budgets required under the provisions of the Research Plan which are prepared by NMFS and ADF&G staff. This committee will not have oversight of the daily operations of the Research Plan. The chairman of the Council will appoint 11 members to the Committee to include industry representatives from the following groups: factory/trawler, catcher/trawler, shoreside processor, crabber, freezer/longliner, non-freezer/longliner, and crab catcher/processor, under 60' vessels, observers, observer contractors, and an independent Observer training representative.

1.2 Purpose of the Public Hearing Package

This document provides background information and assessments necessary for the Secretary of Commerce to determine if the North Pacific Fisheries Research Plan is consistent with the Magnuson Act and other applicable law. It also provides the public with information to assess the alternatives that are being considered and to comment on the alternatives. These comments will enable the Council and Secretary to make more informed decisions concerning the resolution of the management problems being addressed.

1.2.1 Environmental Assessment

One part of the package is the environmental assessment (EA) that is required by NOAA in compliance with the National Environmental Policy Act of 1969 (NEPA). The purpose of the EA is to analyze the impacts of major federal actions on the quality of the human environment. The EA serves as a means of determining if significant environmental impacts could result from a proposed action. If the action is determined not to be significant, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. An environmental impact study (EIS) must be prepared if the proposed action may be reasonably expected: (1) to jeopardize the productive capability of the target resource species or any related stocks that may be affected by the action; (2) to allow substantial damage to the ocean and coastal habitats; (3) to have a substantial adverse impact on public health or safety; (4) to affect adversely an endangered or threatened species or a marine mammal population; or (5) to result in cumulative effects that could have a substantial adverse effect on the target resource species or any related stocks that may be affected by the action. Following the end of the public review period, the Council could determine that the proposed user fee system will have significant impacts on the human environment and proceed directly with preparation of an EIS.

1.2.2 Regulatory Impact Review

Another part of the package is the Regulatory Impact Review (RIR) that is required by National Marine Fisheries Service (NMFS) for all regulatory actions or for significant Department of Commerce or NOAA policy changes that are of significant public interest. The RIR: (1) provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; (2) provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems; and (3) ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are major under criteria provided in Executive Order 12291 and whether or not proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act (P.L. 96-354, RFA). The primary purpose of the RFA is to relieve small businesses, small organizations, and small governmental jurisdictions (collectively, "small entities") of burdensome regulatory and record-keeping requirements. This Act requires that the head of an agency must certify that the regulatory and record-keeping requirements, if promulgated, will not have a significant effect on a substantial number of small entities or provide sufficient justification to receive a waiver.

This RIR analyzes the impacts of user fee system alternatives. It also provides a description of and an estimate of the number of vessels and processors (small entities) to which regulations implementing these amendments would apply.

1.3 Description of 1991 Domestic Fishing Fleet and Processors

The NMFS vessel permit database has been examined to determine the current composition of the domestic groundfish fishing fleet. A total of 1,909 vessels may fish for groundfish in the Bering Sea and Gulf of Alaska in 1992 (Table 1.1). This number is based on 1992 Federal groundfish permits that have been issued to domestic vessels as of March 31, 1992. Fishing operations in which these vessels participate include: harvesting only, harvesting and processing, processing only, and support. The latter type of operation includes transporting fishermen, fuel, groceries, and other supplies to other vessels.

Of the total 1,909 vessels, 96 percent, or 1,835, are five net tons or larger. Four percent, or 74 vessels, are less than five net tons (Table 1.2).

Vessels Five Net Tons or Larger

The larger vessels, i.e., those that are 5 net tons or larger, are located in Seattle, Sitka, Kodiak, and Dutch Harbor, and other ports. Most of these larger vessels come from Alaska, based on telephone area codes given with permit applications. The numbers of vessels that come from Alaska is 1092, the number from the Seattle area is 534, and the number from other areas is 209. These numbers are summarized in Table 1.3 by processing mode.

The total number of catcher vessels (harvesting only) and catcher/processor vessels (harvesting/ processing) is 1,559 and 153, respectively. Net tonnages of catcher vessels and catcher/processor vessels vary widely. The total net tonnage of the catcher vessels is 74,423 tons, and the total net tonnage of the catcher/processor vessels is 65,511 tons.

Vessels involved in harvesting only (catcher vessels) employ mostly three types of gear: hook-and-line (longline), trawls, or pots. Most of the catcher vessels are hook-and-line vessels and number 831 (Table 1.3). They are the smallest vessels fishing groundfish, having average net tonnage capacities equal to 29 tons and average lengths of 48 feet. NOTE: It is anticipated that this small vessel category will increase substantially during the year as vessels obtain their 1992 permits and prepare for the opening of the halibut and sablefish seasons. In 1991, there were approximately 1,249 longline vessels in this category.

Vessels involved in harvesting and processing (catcher/processor vessels) also employ mostly hook-and-line, trawls, or pots. The number of catcher/processor vessels using hook-and-line gear is 45 (Table 1.4). These vessels are the smallest of the catcher/processor vessels, having average net tonnage capacities equal to 203 tons and average lengths of 116 feet, but are larger than the catcher vessels using hook-and-line gear. Pot vessels number 11 and trawl vessels number 36. Their respective average net tonnage capacities are 363 and 965 tons. Their respective average lengths are 156 and 219 feet. Vessels involved in processing only (motherships) number 22. These vessels are large, having average net tonnage capacities equal to 2,452 tons and average lengths of 273 feet. The numbers of vessels by length, by gear type, and by operating mode are summarized in Table 1.5 .

Vessels involved in the 1990 king crab fishery (a fall fishery) utilize pot gear with 290 vessels over 50' in length registered in the Bering Sea and Aleutian Islands Management Area. Of these 290 vessels, 263 registered to fish in the Bristol Bay district and 27 chose to fish in the Dutch Harbor district.

The 1991 Bering Sea Tanner crab fisheries opened on January 15 with 300 vessels over 50' registered. The Gulf of Alaska Tanner crab fisheries opened on the same date with 105 vessels registered to fish in the Kodiak district and 5 vessels choosing to fish in the Alaska Peninsula district.

Table 1.1 Numbers of groundfish vessels that are Federally permitted to fish off Alaska in 1992 from the Seattle area, Alaska and from other areas. All vessels 5 net tons or larger.

	Number			
	Seattle Area	Alaska	Other Areas	Total
Mode				
CATCHER	348	1026	185	1559
CATCHER/PROCESSOR	102	36	13	151
PROCESSOR	18	3	1	22
SUPPORT ONLY	30	3	0	33
CATCHER & CATCHER/PROCESSOR	19	22	10	51
CATCHER PROCESSOR & PROCESSOR	15	1	0	16
CATCHER, CATCHER/PROCESSOR & PROCESSOR	2	1	0	3
TOTAL	534	1092	209	1835

Table 1.2 Numbers of groundfish vessels that are less than 5 net tons or 5 net tons and larger that are Federally permitted in 1992 to fish off Alaska. NMFS data through March 31, 1992.

Mode	Number of Occurrences < 5 nt	>= 5 n	total
CATCHER	71	1559	1630
CATCHER/PROCESSOR	2	151	153
PROCESSOR	0	22	22
SUPPORT ONLY	0	33	33
CATCHER & CATCHER/PROCESSOR	1	51	52
CATCHER PROCESSOR & PROCESSOR	0	16	16
CATCHER, CATCHER/PROCESSOR & PROCESSOR	0	3	3
TOTAL	74	1835	1909

Table 1.3 Numbers and statistics of CATCHER VESSELS by gear type that are Federally permitted to fish off Alaska in 1992. *Includes catcher vessels that are also permitted as Catcher/Processors and/or Processors. All vessels 5 net tons or larger.

Mode	Number	Avg. Net Tons	Avg. length (ft)
HOOK-AND-LINE	831	29	48
POTS	93	105	91
TRAWL	96	150	101
OTHER GEAR 1/	593	59	64
TOTAL	1613		

1/ Other gear includes combinations of hook-and-line, pots trawls, jigs, troll gear, and gillnets.

Table 1.4 Numbers and statistics of CATCHER/PROCESSOR and PROCESSOR VESSELS by gear type that are Federally permitted to fish off Alaska in 1992. All vessels 5 net tons or larger.

	Number	Average NT	Average length (ft)
CATCHER/PROCESSOR only			
HOOK-AND-LINE	45	203	116
POTS	11	363	156
TRAWL	36	963	219
OTHER GEAR [1/]	59	300	134
TOTAL	151		
PROCESSOR only	22	2452	273
CATCHER/PROCESSOR & PROCESSOR			
HOOK-AND-LINE	1	598	220
POTS	1	659	210
TRAWL	15	1682	264
OTHER GEAR	2	654	185
TOTAL	19		

1/ Other gear includes combinations of hook-and-line, pots, trawls, jigs, troll gear, and gillnets.

Table 1.5 Numbers of vessels Federally permitted to fish off Alaska in 1992 by 25-foot length increments, by gear type and by operating mode. Support vessels are excluded. Other = multiple gear. NMFS data through March 31, 1992

	Catcher Only				Catcher/ Processor Only				Processor Only
Length (ft)	Trawl	Pot	LL	Other	Trawl	Pot	LL	Other	
<= 24	0	0	14	4	0	0	0	0	0
25 - 49	2	18	563	243	0	0	9	11	0
50 - 74	18	15	255	187	0	1	1	4	0
75 - 99	39	16	29	84	0	0	6	2	0
100-124	18	27	4	45	2	0	6	4	0
125-149	9	9	1	9	3	1	12	10	1
150-174	1	5	0	8	4	6	8	14	5
>= 175	5	0	0	2	27	3	4	15	16
SUBTOTALS	92	90	866	582	36	11	46	60	22

TOTAL CATCHER & PROCESSOR VESSELS	1876
TOTAL SUPPORT VESSELS	33
TOTAL VESSELS	1909

1.4 Description of the Alternatives

1.4.1 Alternative 1: Status Quo

With Alternative 1, the existing observer requirements would remain in place for the groundfish fisheries and each vessel or processor that is required to have observer coverage would continue to be responsible for obtaining the required observers from a certified contractor. To the extent that other Federal funds are available for the observer program, they would be used to pay for NMFS management of the program and, if possible, for observers. NMFS management costs include the cost of training and outfitting observers; the cost of receiving, reviewing, and entering observer data; the cost of debriefing observers; and the cost of managing the observer program. This alternative would require amending the current Observer Program to correct existing deficiencies.

1.4.2 Alternative 2: Establish a Research Plan and a system of user fees to pay for the costs of implementing the Plan

The Magnuson Act authorizes the Council and the Secretary to establish a North Pacific Fisheries Research Plan (Plan) which: (1) requires that observers be stationed on fishing vessels and at fish processing facilities and (2) establishes a system of fees to pay for the cost of implementing the Plan. One option being considered is extension of the current levels of observer coverage for the initial implementation of the Research Plan. Analyses of appropriate levels of coverage are contained in Section 2.3.4. For one option being considered, State of Alaska observer requirements for the BS/AI king and Tanner crab fisheries would also be included.

The user fee system of Alternative 2 includes options with respect to the levels of observer coverage, the potential transition period from the current program to the Research Plan program, the State observer program for the BS/AI king and Tanner crab fisheries, discards, the donut hole, the frequency of fee collections, methods to address shortfalls in funding, and methods to cover the up front funding requirements of the Research Plan. These options are described and evaluated in Section 2 of this document.

Two alternative methods of paying for observer coverage are considered. They are: (1) the status quo and (2) the user fee system and options proposed below.

Amendments to the Act that authorize the Plan also require the Secretary to review the feasibility of establishing a risk sharing pool to provide insurance coverage for vessels and owners against liability from civil suits by observers. If such a pool is established, it also would be funded with the user fees discussed in this report. However, NMFS must first conduct a feasibility analysis on whether a government designed risk sharing pool is necessary. Such an analysis is not yet completed, and provisions of the risk sharing pool will be addressed separately from this document. This issue will need to be resolved prior to final approval of the Research Plan.

The Council and industry are sufficiently dissatisfied with the current method of paying for observer coverage that they would like to have an improved method of funding available for 1993. This will not occur unless the Plan is approved by the Secretary and funds are available well before the end of 1992. Timely approval will be facilitated by a Plan that can be understood readily by the industry, Council, and management agencies. Timely approval will also require the Plan to be clearly consistent with the Act, and other applicable laws. The Act specifies the following requirements.

1. The Plan will require that observers be stationed for the purpose of collecting data necessary for the conservation, management, and understanding of any fisheries under the Council's jurisdiction.

2. The Plan will establish a system of fees to pay the cost of implementing the Plan.

3. The Plan shall be reasonably calculated to:

    a. gather reliable data,

    b. be fair and equitable to all vessels and processors,

    c. be consistent with applicable laws, and

    d. consider the operating requirements of the fisheries and the safety of observers and fishermen.

4. Any system of fees shall:

    a. limit the total fees to implementation costs minus any amounts authorized under other provisions of law and any surplus in the North Pacific Fishery Observer Fund,

    b. be fair and equitable to all participants in the fisheries,

    c. limit the costs that are recoverable,

    d. not be used to offset amounts authorized under other provisions of law,

    e. be expressed as a percentage not to exceed two percent of the ex-vessel value of the plan fisheries,

    f. be assessed against all fishing vessels and fish processors including those not required to have observers, and

    g. provide that the fees only be used for implementing the Plan.

2.0 ANALYSIS OF THE ALTERNATIVES

2.1 Alternative 1: Status Quo

It is estimated that the cost of providing the currently required level of observer coverage for the groundfish fishery in 1992 will be approximately $8.6 million. The costs of the ADF&G shellfish observer program are estimated to be $2.98 million. Eighty percent of these costs are currently paid for directly by those vessels and processors required to carry observers. There are several reasons why the cost as a percentage of ex-vessel value would vary substantially among operations (and why the status quo is viewed as inequitable): this cost would be paid only by operations with required observer coverage; observer coverage requirements range from less than 30% to 100% for operations required to have observers; the cost per unit of observer coverage will vary among operations and contractors; and, the exvessel value of harvest per unit of observer coverage will also vary substantially. Therefore, the equity problems would remain. The problems resulting from both the limited control NMFS would have over the observer program, and the potential conflict of interest, would also remain.

2.2 Alternative 2: Establish a Research Plan and system of user fees to cover the costs of observer requirements

Alternative 2 includes a variety of options with respect to the levels of observer coverage, potential transition period, State observer requirements for the king and Tanner crab fisheries, discards, the donut hole, the frequency of fee payments, and methods to address potential shortfalls in funding. Section 2.2.1 summarizes the Council's objectives for the Research Plan and the following sections describe the specific provisions of the Research Plan including options within those provisions. Sections 2.3.8 and 2.3.9 include the cash flow scenarios which result from the various options before the Council with respect to coverage levels, up front funding, and potential shortfalls.

Under the Research Plan, the estimated cost of providing the currently required level of observer coverage for the groundfish fishery in 1992 will be approximately $8.6 million (Table A1 - Appendix I). Of this total, $6.9 million is the direct cost of observer coverage and the remaining $1.7 million is the NMFS operational cost. This includes the cost of training and outfitting observers; the cost of receiving, reviewing, and entering observer data; the cost of debriefing observers; and the cost of managing the observer program. The costs of the ADF&G shellfish observer program are estimated to be $2.9 million, of which $2.4 million is the direct cost of placing observers and $.5 million is the ADF&G operational budget (Table A5 - Appendix I). The estimated ADF&G operational costs are based on training being conducted by ADF&G. This estimate could change if training is conducted by an outside entity. Detailed cost estimates for the initial year of the Research Plan, for both the groundfish and shellfish programs, are contained in Appendix I.

2.2.1 Objectives of the Research Plan

1. To provide a framework for developing an observer program for the Alaska groundfish fishery which has the capability to perform inseason management, to accommodate status of stocks assessment and to provide accurate, real-time data of sufficient quality to implement an individual vessel incentive program.

2. To provide a framework for developing an observer program for Bering Sea/Aleutian Islands king and Tanner crab fisheries which accommodates inseason management needs, ensures management compliance, and provides for the collection of biological and management data necessary to achieve the sustained yield of the crab resource without overfishing.

3. To ensure that the groundfish and crab observer programs are efficient and cost effective, that any increased costs are commensurate with the quality and usefulness of the data to be derived from any revisions to the programs, and that such changes are necessary to meet fishery management needs.

4. To provide for cooperation and coordination between the groundfish observer program administered by the NMFS and the crab observer program administered by the Alaska Department of Fish & Game.

2.3 Analysis of Specific Provisions and Options of the Proposed Research Plan

2.3.1 Inclusion of State of Alaska Crab Fisheries

The State of Alaska requires that catcher/processors and floating processors participating in the BS/AI king or Tanner crab fisheries pay for observers from certified contractors unless they process crab in areas that are being serviced by ADF&G dockside samplers. The observer program for all processing in such areas is paid for by the State. The three options being considered concerning this observer program are listed below.

1. User fees will be collected from all processors that receive BS/AI king or Tanner crab but the State observer program will not be incorporated into the Plan; fees would be used to fund the NMFS groundfish program.

2. BS/AI king and Tanner crab catch associated with observer coverage that is paid for directly by catcher/processors or floating processors is exempt from the Plan's user fees. User fees would be assessed against those who do not currently pay directly for observer coverage; the State observer program would not be incorporated into the Plan.

3. User fees will be collected from all processors that receive BS/AI king or Tanner crab and the State observer program will be incorporated into the Plan, including the dockside sampler program **(PREFERRED ALTERNATIVE).**

Compared to Option 1, Option 2 is substantially less equitable in terms of benefits received because the benefits that a crab operation receives from the groundfish observer program are not strictly dependent on its contribution to the State observer program. It is also substantially less equitable in terms of costs induced because it would, to some extent, relieve at-sea crab processors of some of the costs induced by their operations. But Option 2 is more equitable in terms of ability to pay because the ability of an at-sea crab processor to pay the user fees is somewhat decreased by its payment for crab fishery observers. From perspective of Shellfish fleet, Option 2 may be more equitable in terms of overall costs being spread across the fleet, and in terms of eliminating double payment by one sector of the fleet, as long as coverage levels are not increased for these fisheries.

Option 2 will decrease the probability that the fees will be sufficient to pay the recoverable cost of the Plan. It is estimated that about $130 million of crab will be taken by operations that would be exempt from the user fees with Option 2. Option 2, therefore, would likely add about $1.6 million in fees that could be used to help fund the costs of the groundfish program. This $1.6 million represents one-half of the 2% value of the remaining total ex-vessel value of the crab fisheries. More definitive estimates of the potential funds under this option are being developed, and would be available at the annual reviews called for under the provisions of this Research Plan.

By including the cost of the State observer program for the BS/AI crab fisheries, Option 3 would increase the cost of implementing the Plan by approximately $2.98 million. Option 3, however, could generate approximately $5.8 million in additional fees (at the maximum 2% fee level); these additional fees could be used to offset potential shortfalls in the groundfish portion of the program.

In the example above, there is an excess amount of money generated by the fees on crab processors over and above the costs of the crab program specifically. Due to fluctuating levels of harvest, prices, and other factors, this may not always be the case. Therefore, a decision must be made concerning the potential of differential shortfalls between the groundfish and shellfish portions of the Research Plan. For example, if all fees from all fisheries are pooled in the Observer Fund, and then disbursed proportionally to cover the costs of observer coverage in each fishery (groundfish and crab), then there is the potential for shortfalls in each fishery which might require a supplemental observer program to maintain desired coverage levels. Alternately, funds could be designated for each fishery, groundfish or crab, and those funds spent only to cover observer expenses for those fisheries. This would, in effect, create two Observer funds. Excess funds in one fishery might be used to cover costs in the other fishery. Another option is to make this determination on an annual basis after evaluating the anticipated costs and fees for the upcoming fishing year.

2.3.2 Fee Assessment

The North Pacific Fisheries Research Plan fee assessment program will be based on the following:

1. Fisheries subject to fee assessment;

    a. Gulf of Alaska groundfish.

    b. Bering Sea and Aleutian Islands groundfish

    c. North Pacific halibut

    d. Bering Sea and Aleutian Island king and Tanner crab

2. Fees will be assessed at up to 2% of ex-vessel value of fish and crab harvested in the fisheries identified above, before any processing occurs. Though the potential maximum fee is prescribed by the Magnuson Act, the actual maximum for any given year may be less after determining the cost of the Plan and after deducting funds from other sources, if required (discussed below).

3. Fees from the program may only be used to pay for: (1) stationing observers including the direct costs of training, placing, maintaining, and debriefing observers; (2) collecting, verifying, and entering collected data (not manipulating data); (3) supporting an insurance risk-sharing pool; and (4) paying the salaries of personnel to perform these tasks. The fees cannot be used to pay administrative overhead or other costs not directly incurred in carrying out the Plan, or to offset amounts authorized under other provisions of law.

4. Annually the Regional Director, in consultation with the Council, will establish a fee percentage taking into account the ex-vessel value of the plan fisheries, the costs of implementing the Plan, other sources of funds, and limitations on the total amount that can be collected. This will be done concurrent with Council review of observer needs of the fisheries. This annual process will be completed by the time the fisheries commence. The fee will be expressed as a percentage of the ex-vessel value of the fisheries.

    Option: Council would receive recommendations on modification of observer coverage levels at September Council meeting each year and concurrently determine the anticipated fees for the following year, send out for public review, and take action at the December meeting.

Option: Council would receive recommendations on modification of observer coverage levels at June Council meeting each year and concurrently determine the anticipated fees for the following year, send out for public review, and take action at the September meeting **(PREFERRED ALTERNATIVE).**

a. The Chairman of the Council shall establish the Observer Plan Oversight Committee, identified earlier in this outline, to provide the Council with an independent review of the budget and implementing measures for the observer program and fee assessment system.

b. The reports and budget documents outlined above shall be provided annually to the Council a month prior to its June (September) meeting. The Oversight Committee shall review the documents and provide a recommendation to the Council at the June (September) meeting. The Council will review the Committee's recommendation and take final action in September (December).

5. All plan fisheries will contribute to the total ex-vessel value of the fisheries; NMFS, in consultation with the Council, will use the best information available to project the ex-vessel value of fisheries. The factors that will be taken into account include but are not limited to: average prices for species or species groups, product forms, discards, and other factors during the year preceding the year for which the fee is being established, anticipated changes in the coming year, and projected catch based on expected harvest in plan fisheries. These projected values will be subjected to public review. Initial estimates are shown below:

FISHERY	1991 EX-VESSEL VALUE ($ millions)	1% FEE VALUE ($ millions)	2% FEE VALUE ($ millions)
GOA/BSA Groundfish	$518.0	$5.18	$10.36
GOA/BSA Halibut	98.0	0.98	1.96
BS/AI king and Tanner Crab	296.2	2.96	5.92
Totals	$912.2	$9.12	$18.24

Table 2.1 below provides a more detailed summary of the potential value of the fisheries by species or species group.

Table 2.1 EX-VESSEL VALUE FOR 1991 BY FISHERY ($ millions)

	metric tons	$/lb	Value ($ millions)
BS/AI & GOA Groundfish			
Pollock	1,284,601	$0.090	$255
Pacific cod	251,809	0.228	127
Rockfish	23,247	0.246	13
Flatfish	152,298	0.151	51
Sablefish	28,263	1.000	62
Atka mackerel	25,740	0.133	8
Other	6,347	0.220	3
Subtotal	1,772,304	0.133	$518
	Pounds (millions)	$/lb	Value ($ millions)
BS/AI King & Tanner Crab			
Red king crab	17.5	$3.00	$54.4
Blue king crab	3.4	2.80	9.5
Golden king crab	6.8	2.80	18.5
Tanner crab (bairdi)	36.0	1.30	51.5
Tanner crab (opilio)	328.6	0.50	162.3
Subtotal	392.3	-	$296.2
BS/AI & GOA Halibut	49.0	$1.99	$98.0
Total Value			$912.2

The estimated groundfish prices and weights are preliminary PacFIN values as of 12/31/91. Average prices for the year across all product forms for each species or species group.

6. NMFS, with the assistance of ADF&G, will provide an estimate of the costs of providing required observer coverage for the groundfish and shellfish programs for the coming year based on anticipated observer coverage.

7. NMFS will provide an estimate of surplus funds in the North Pacific Observer Fund and estimate the amounts of funds that may be available from other sources.

8. The fees shall be set such that the total amount of fees collected are not expected to exceed the limitation prescribed by the Magnuson Act **(now set at up to 2% of exvessel value).**

9. The user fee percentage for the coming year will be the total amount to be collected divided by the ex-vessel value of the plan fisheries, multiplied by 100. This fee will be established before the fishing year to which it will apply. It will be subject to Council and public review before being finalized.

10. The State of Alaska will be reimbursed for all of the costs of the crab observer program which are allowable under the MFCMA from fees collected under the North Pacific Fisheries Research Plan.

2.3.2.1 Evaluation of discard options

There are two reasons discards occur in the user fee fisheries. First, fishery regulations prohibit the retention of specific species, female crab, or sub-legal crab and halibut. Second, the economics of the fisheries, which are in part determined by fishery regulations, and the selectivity of fishing gear result in most operations voluntarily discarding additional catch. The two options being considered for discards are listed below.

1. Only retained catch will be subject to the user fees **(PREFERRED ALTERNATIVE).**
2. Both retained catch and discards will be subject to the user fees.

One advantage of Option 2 is that it would increase the limit on total user fees set by the 2% rule. The increase could be as much as $1.8 million. If all groundfish discards are valued using the ex-vessel prices of landed catch and if prices are not adjusted downward to reflect the increased supply that would result if all groundfish were retained, the value of groundfish discards would be about $71 million (Table 2.2 below). This estimate assumes that the value of the discards is equivalent to the value of the landed catch for each species or species group. If crab and halibut discards in the groundfish fisheries are valued in terms of foregone ex-vessel value in the crab and halibut fisheries, their value could exceed $20 million. Adding this amount to the estimated value of groundfish discards results in a total of $91 million, which would equate to an additional fee of $1.8 million under a full 2% fee. However, estimates of the value of discards in the crab and halibut fisheries are not available at this time.

Assigning a value to discards that is 100% of the ex-vessel value of landed catch may be overstating the value of these discards. If they were in fact worth that much, they likely would be retained rather than discarded. A range of possible values is offered here to provide an idea of the potential additional revenues which could be expected if discards were included under the fee assessment. For example, if they were assigned a value of 75% of the value of retained catch, the additional fees collected would be reduced from $1.4 million to $1.05 million (groundfish fisheries only). If discards were valued at 50% of the value of landed catch, then the additional revenues would be further reduced to $.7 million.

Table 2.2 Estimated Discards, and Potential Value of Discards, in the 1991 BS/AI and GOA Groundfish Fisheries.

Species	Metric tons	$/pound[1/]	Potential Estimated Value[2/]	Fee
Pollock	96,245	.09	19.1	.381
P. Cod	9,526	.228	4.8	.096
Rockfish	4,823	.246	2.6	.052
Flatfish	105,261	.151	35	.70
Sablefish	245	1.0	.5	.010
Atka Mackerel	2,415	.133	.7	.014
Other	16,997	.22	8.2	.164
			$ 71 million	$1.42 million

1/ Ex-vessel value - weighted averages for each species group across all product forms.
2/ In millions of dollars; estimated value assumes value of discards equal to ex-vessel value of landed fish.

This highly speculative and potentially controversial $1.8 million (approximate) increase in the total fees that could be collected could eliminate some of the potential funding deficit projected under some of the alternatives for this Research Plan. The other advantage is that it would provide some incentive to reduce discards. However, if the fee is limited to 2% of the ex-vessel value of discards, the effect on discards probably would not be significant. A partially offsetting disadvantage is that a fee on discards would provide operations an additional reason to understate discards. Additionally, depending on the relative value assigned to discards, the additional revenues generated may not be significant enough to outweigh the problems associated with this alternative.

Some of the other disadvantages of Option 2 result from the difficulty in estimating discards accurately for some fisheries or operation. There is also difficulty in determining which discards to include, and the difficulty of determining the ex-vessel value of even a known quantity of discards.

Estimates of groundfish and prohibited species discards in the groundfish fishery are available for individual operations by the observer program. However, these estimates are only available when the operations are observed. Therefore, it is very difficult to estimate accurately the discards either of an operation when it is not being observed or of an operation that is never observed. The difficulty occurs because discards are highly variable by operation, time, area, and target. There would be similar problems for the crab fisheries. The problem would be substantially greater for the halibut fishery because there is not a comparable observer program for halibut at this time.

With Option 2, a decision would have to be made concerning which discards will be subject to the user fees. The fees could be assessed against all discards or just specific types of discards. The types of discards include: (1) groundfish and prohibited species in the groundfish fisheries; (2) sub-legal male and female crab, crab deadloss, non-target species of crab taken as bycatch, and finfish in the crab fisheries; and (3) sub-legal halibut, crab, and other finfish in the halibut fishery. Similarly, it would have to be determined if the fees would be assessed on discards or discard mortality. These determinations probably would delay the implementation of the Plan, in part because they would be controversial.

The ex-vessel value of discards would be difficult to estimate because discards occur for a variety of reasons. In the traditional sense of ex-vessel value, the ex-vessel value of discards is zero because they are not landed. Alternatively, the value of prohibited species and other discards can be estimated in terms of: (1) its value if it were landed; (2) its value in terms of the associated landed catch that would to some extent not be possible without bycatch and discards; or (3) the value of foregone catch in the fisheries that target on what other fisheries discard. In the case of voluntary discards, the per unit ex-vessel value of, for example, pollock that is discarded in the pollock fishery is less than that of retained pollock or it would not be discarded. The determination of the value per unit of discard probably would delay the implementation of the Plan, in part because it would be controversial.

Option 2 would tend to be less equitable in terms of benefits received and ability to pay but probably more equitable in terms of induced costs if the costs of the observer program are considered to be induced by the decisions of operations to participate in the groundfish fisheries.

2.3.2.2 Evaluation of donut hole options

Both domestic and foreign vessels are expected to harvest fish from the donut hole (i.e., international waters between the U.S. and Soviet EEZs). The two options being considered for the donut hole are listed below.

1. Do not include donut hole fisheries as plan and user fee fisheries.

2. Include donut hole fisheries as plan and user fee fisheries.

If the donut hole comes under the Council's jurisdiction, it is reasonable to assume that the user fees will be extended to the donut hole automatically. Conversely, if the Council does not gain jurisdiction over the donut hole fisheries, the Act probably does not provide authority to include these fisheries as Plan or user fee fisheries.

The establishment of a substantial link between the status of stocks in the U.S. EEZ and donut hole fish is necessary, but perhaps not sufficient, to extend the Council's jurisdiction. The fact that cooperative international research is underway to determine if there is such a link suggests two things: (1) the link has not been established but (2) it is possible that it will be.

Because the extension of the fees to the donut hole probably would be accompanied by an extension of the Council's jurisdiction that would be used to reduce catches in the U.S. EEZ and the donut hole to the current levels in the EEZ alone, it is quite possible that there would be no effect either on the ex-vessel value of the Plan fisheries or on the total user fees that are collected. Any resulting increase in user fees, at least in part, would be offset by increased implementation costs resulting from an extension of observer coverage to the donut hole.

It may be prudent to postpone further pursuit of Option 2 until the linkage between the donut hole and the EEZ has been established because the selection of Option 2 could result in controversy that could delay the implementation of the Plan without providing any benefits. Though the Council expressed the desire that Donut Hole fisheries be included under the Research Plan, this package is being submitted without such an inclusion at this time. **The overall PREFERRED ALTERNATIVE, identified in Section 2.9, contains no reference to Donut Hole fisheries.**

2.3.3 Fee Collection

Although fees are assessed against all fishing vessels and fish processors, they are collected from fish processors participating in plan fisheries. Fish processors are defined in the Magnuson Act; however, their operating characteristics fall into one of two categories. Processors are in Category A when they purchase unprocessed fish, that is when there is a documented commercial transaction between independent parties. Processors are in Category B when they obtain fish without such a transaction. For purposes of collecting fees, harvesting vessels are considered Category A processors when they sell directly to any entity other than a federally permitted processor under this plan.

Category A Processors are assumed to be those processors who weigh or otherwise directly determine the amount of all fish delivered. Their fee liability is the product of the fee percentage established by NMFS for the fishing year, ex-vessel price paid to the fishermen, and the amount of fish received. In addition, fees may be required on discards as described above. Fee liability will be divided equally between the processor and fisherman. In determining the ex-vessel price against which to apply the fee percentage, there are two options under consideration:

Option 1. Data provided by all processors who purchased unprocessed fish in the user fee fisheries will be used to estimate the average ex-vessel price by species group for that period. These fishery wide average prices will then be used to calculate the ex-vessel value of the user fee fish used by each processor **(PREFERRED ALTERNATIVE).**

Suboption 1: Average exvessel price calculated on an annual basis. The exvessel price would be calculated, across all product forms, on data from the previous year's fisheries **(PREFERRED ALTERNATIVE).**

Suboption 2: Average exvessel price is calculated on a quarterly basis based on data from the previous quarter. Under this suboption, the average exvessel price applied to a quarter may not be representative of the actual prices received by fishermen. For example, applying the first quarter exvessel prices for pollock to the second quarter's landings would likely overstate the total value of the reported second quarter landings. This is due to a higher price associated with the first quarter roe fishery.

Under either suboption, a reconciliation would be possible at some point, either on a quarterly basis or at the end of the year. This would be necessary to reconcile the projected average exvessel price (upon which fees are based) with the actual average exvessel price which occurred during the year (or quarter). **However, it is the intent of the Council that no such reconciliation be undertaken.**

Option 2. Ex-vessel price and fish usage data provided by each processor who purchased unprocessed fish in the user fee fisheries will be used to estimate the ex-vessel value of user fee fishery fish for that processor and period.

Option 1 has the following advantages: some processors do not purchase unprocessed fish, therefore, an average price would have to be used for such processors; the average prices are subject to public review, the actual prices by processor would not be; the incentive a processor may have to understate the value of the fish it receives is reduced; and, ex-vessel price information is not required from all processors who purchase user fee fishery fish.

The main disadvantage of Option 1 is that it can result in fees that are not as closely linked to the ex-vessel value of the fish used by an individual processor. This is because there can be substantial variability in actual ex-vessel prices among areas, seasons, gear types, processors, ports, and species within a species group.

Consequently, the advantage of Option 2 is that the fees that will be collected from an individual processor will be based on the actual exvessel prices that the processor paid for fish it received from user fee fisheries. This tends to result in greater equity in terms of benefits received and ability to pay.

Category B Processors are defined as follows: if these processors weigh or otherwise directly determine the amount of their catch, then those documented amounts will be used to estimate fee liability. Otherwise, product recovery rates published by NMFS will be used to estimate retained catch. Their fee liability is the product of the fee percentage established by NMFS for the fishing year, an exvessel price as estimated and published by NMFS, and the estimated retained catch. The price estimates provided by NMFS will be based on price data from Category A Processors, taking into consideration the species mix, quarter of the year, area, and other appropriate factors. In addition, fees may be required on discards as described above. For Category B processors, Option 2 above is not a viable option. Exvessel prices for this category would be calculated as described under Option 1; suboptions 1 and 2 would still be alternatives for Council determination.

The other provisions regarding fee collection under the Research Plan are as follows:

1. Fee payments will be made quarterly within 30 days of the end of the quarter to the NOAA Office of the Comptroller to be deposited in the North Pacific Observer Fund within the U.S. Treasury. The fee will be documented in a manner prescribed by NMFS. For Option 2 above, where processors pay a fee based on the actual exvessel price they receive, as opposed to an average, the processor would recalculate its fee liability for those quarters if new information becomes available concerning the exvessel value of the fish it received from plan fisheries during the precious quarter. It will claim any overpayment as a credit on its next quarterly payment and it will add any underpayment to its next quarterly payment.

2. All processors as defined above may be required to have a federal permit to receive fish from plan fisheries. Applications for federal fisheries permits would provide NMFS a means to compile baseline information on processing capacity and activities. As part of the application for a federal fisheries permit, processors could also be required to submit proof that fees for the previous year had been submitted to NOAA, and proof that the processor had obtained an adequate bond or letter of credit to secure the payment of fees for the permit year, as described below.

3. All processors will be required to obtain a bond or letter of credit to cover the anticipated amount of fees, projected on an annual basis.

One of the requirements for a complete Federal permit application for all processors will be the fulfillment of the following:

a. Prepayment of the total annual estimated fee.

b. An irrevocable letter of credit for the annual estimated fee (or twice the estimated fee).

c. A surety bond equal to the annual estimated fee (or twice the estimated fee).

The option of requiring an irrevocable letter of credit is similar to what was required for the foreign observer program and could impose additional costs to processors operating under the provisions of the Research Plan. For an irrevocable letter of credit of one year's duration, to cover twice the full 2% (maximum) projected fee, a processor may likely have to pay about 1% of the total amount of the letter of credit and may have to keep a balance equal to the full amount of the letter of credit in a bank account. Assuming a cost for the letter of credit of 1% and an overall fee projection across all fisheries of $9 million, the total cost of all letters of credit equal to twice the overall fee projection could also be in the neighborhood of $360,000. The cost to any individual processor would depend on the amount of fish processed and the projected amount of the fee owed by the processor. A processor who processed $5 million worth of fish for example, would have to acquire an irrevocable letter of credit at an estimated cost of $2,000 (1% of two times the projected fee of $100,000).

The value of the irrevocable letter of credit could be based on the previous year's processing activity for any processor or on a projection contained in the application for an annual federal permit proposed under this Plan.

The provision for requiring a bond would impose additional costs to processors operating under provisions of the Research Plan. For a bond of one year's duration, to cover the full 2% projected fee, a processor would likely have to pay from 1%-3% of the total bond value. This 1%-3% estimate is based on average bond costs relating to the State of Alaska bond requirements to cover raw fish taxes. Assuming an average of 2%, and an overall fee projection across all fisheries of $9 million, the total cost of all bonds across all processor would be in the neighborhood of $360,000. The cost to any individual processor would depend on the amount of fish processed and the projected amount of the fee owed by that processor. A processor who processes $5 million worth of fish (exvessel value) for example, would have to acquire a bond at an estimated cost of $2,000 (2% of the projected fee of $100,000). If the bond requirement is for twice the anticipated fee, these additional costs would double.

The value of the bond required could be based on the previous year's processing activity for any processor or on a projection contained in the annual federal permit proposed under this Plan. If a processor is unable to obtain a bond, an option would be pre-payment of the projected fee or, possibly, a lien on real property in lieu of the bond.

PREFERRED ALTERNATIVE: In order to cover anticipated fee liabilities, the Council is recommending requirement of a bond or letter of credit equal to the projected annual fee for the upcoming calendar year. This bond or letter of credit would be in place for the entire year. Prepayment of fees would remain an option for the processor.

2.3.4 Required levels of observer coverage

In determining the level of observer coverage or sampling required to carry out the objectives of the Research Plan, Standards contained within the Magnuson Act require that the Plan be calculated to:

a. "gather reliable data, by stationing observers on all or a statistically reliable sample of the fishing vessels and United States fish processors included in the plan,...";
b. be fair and equitable to all vessels and processors;
c. be consistent with applicable laws; and,
d. consider the operating requirements of the fisheries and the safety of observers and fishermen.

As a result, there are a number of options for the groundfish program which can be considered in setting the required levels of observer coverage in the Plan. The only option considered for the ADF&G shellfish program is the current requirement of the State of Alaska for 100% coverage of all catcher/processors and floating processors in the BS/AI crab fisheries. The levels of observer coverage must be set to meet both the objectives of the Plan and remain within the 2% of ex-vessel value of the fishery ceiling on the amount of fees which can be collected to fund the programs.

2.3.4.1 NMFS groundfish program

a. The level of observer coverage required for the groundfish fishery will be established by the Plan. Three options are proposed for consideration.

(i) Option 1. Status quo. **(PREFERRED ALTERNATIVE for initial implementation)** Under the present industry funded program, all vessels 60 feet length overall (LOA) or greater must carry observers. All shore side plants, floating processors, and motherships must provide observers for any month in which they process 500 tons of groundfish or more. Though all vessels or processors who meet the minimum length or processing requirements must carry observers, the percent of time that an observer needs to be present varies by size of vessel or monthly processing activity. Present levels of observer coverage are: 100% for vessels 125 feet LOA and larger and for shore plants, floating processors and motherships which process 1,000 t or more in a month; and, 30% for vessels 60 to 125 feet LOA and shore plants, floating processors and motherships which process 500 t to 1,000 t in a month. The 30% observer coverage requirement for vessels is on a quarterly basis for any calendar quarter in which the vessel fishes 10 or more days. Vessels less than 60 feet LOA are not required to carry observers unless directed to do so by the NMFS Regional Director. Shore plants, floating processors and motherships are not required to provide observer coverage in months that less than 500 t of groundfish are received.

(ii) Option 2. 100% observer coverage. Statistical analysis of data collected in the 1990 and 1991 observer programs shows that coverage of all vessels 100% of the time is required for individual vessel incentive programs and other programs requiring management of individual vessels (Appendix II). An additional analysis of the 1991 observer data shows that high levels of observer coverage (generally greater than 70% to 80%) are required to estimate the percent composition or incidence (percent by weight, number/t or kilogram per ton) of species such as salmon, halibut, and crab which occur in low levels as bycatch in groundfish fisheries (Appendix II).

(iii) Option 3. 30% observer coverage. The statistical analysis of 1991 observer data used to estimate species composition (Appendix II) shows that in contrast to bycatch species, lower levels of observer coverage may be adequate to estimate the catch and composition of the target or primary species of groundfish taken in the catch. If the estimation of the catch of the target groundfish species is the program's primary objective, lower levels of observer coverage may be adequate.

(iv) Option 4. Coverage for the halibut fisheries. The Council requested that the option be included within the Research Plan for some level of observer coverage to be considered for vessels participating in the halibut fisheries. The halibut fisheries are not currently operating under any observer requirements. This fishery is characterized by very brief openings, currently one day openings in the major harvesting areas, and an extremely fast pace which may result in significant amounts of bycatch of non-target species. Rockfish are one example of a species which is encountered in this fishery. Due to bycatch, as well as other considerations, it may be beneficial to have some amount of observer coverage for vessels participating in this fishery.

Drawbacks to requiring observer coverage for these vessels include the relative shortness of the season and the fact that many of the vessels participating in this fishery are too small to accommodate observer coverage. The fact that the season is so short, accompanied by the ability to account for the overall catch through port monitoring, may indicate that the potential benefits to be derived through observer coverage would be outweighed by the costs associated with that coverage. One option would be to initiate a pilot program for this fishery which might include those vessels already required to carry observers for other fisheries in which they participate. Other vessels which are large enough to accommodate observers could be included in the pilot program. After an appropriate amount of time, data collected from the pilot program could be evaluated to determine if the benefits derived from that information support continuation of coverage for this fishery.

In the event that an Individual Fishing Quota (IFQ) system is implemented for these fisheries, the costs and benefits associated with observer coverage in the halibut fisheries may change. Many vessels participating in this fishery may be doing so in conjunction with other fisheries. Under this scenario, it may be worthwhile to consider bringing this fishery under the more general requirements which pertain to other groundfish fisheries. For example, observer requirements would be based on vessel size as is the case for the other fisheries.

b. Changes to the existing groundfish observer program to improve the accuracy and availability of observer data may be implemented by the Alaska Regional Director (NMFS) upon recommendation by the Council based on one or more of the following:

 (i) a finding that there has been, or is likely to be, a significant change in fishing methods, times, or areas for a specific fishery or fleet component;

 (ii) a finding that there has been, or is likely to be, a significant change in catch or bycatch composition for a specific fishery or fleet component;

 (iii) a finding that modifications to the observer program are warranted to improve data quality and availability necessary to implement an individual vessel incentive program for a specific fishery or fleet component.

 (iv) a finding that such modifications are necessary to improve data availability or quality in order to meet specific fishery management objectives.

 (v) a determination that any increased costs are commensurate with the quality and usefulness of the data to be derived from any revised program, and are necessary to meet fishery management needs.

<u>Evaluation of observer coverage level options for groundfish program.</u>

The Council must evaluate the primary sampling and data collection objectives for the groundfish program and their relative importance in setting the levels of observer coverage to meet them. The first objective of the Plan calls for the establishment of a groundfish observer program that has the "capability to perform inseason management, to accommodate status of stocks assessment and to provide accurate, real-time data of sufficient quality to implement an individual vessel incentive program." The statistical analyses which have been completed on observer data collected in 1990 and 1991 show that 100% coverage is required to carry out individual vessel incentive programs while lower levels of coverage, possibly 30% and in some cases lower, are required to estimate the catch of target species in groundfish fisheries.

Option 1, which would require the same observer coverage requirements as currently in place for the industry funded program, provides for 100% coverage of a large portion of the groundfish catch. Current estimates of the cost of this option indicate that the required program could be funded through the funds available from the 1% fee. In 1991, 75% of the groundfish catch was taken by this portion of the fleet while accounting for only 39% of the total fishing effort in number of fishing days. All of the sampling objectives can be accomplished for this segment of the fleet at this level of coverage.

Twenty-two percent of the 1991 catch was taken by vessels in the 30% coverage class while 39% of the fishing effort was attributed to these vessels. The disadvantage of Option 1 for this class of vessels is that 30% coverage does not allow for individual vessel incentive programs to be carried out for these vessels nor will it provide sufficient sampling to produce reliable estimates of the bycatch rates of species which occur infrequently in the catch, such as salmon, halibut and king and Tanner crab. An additional disadvantage is the present requirement for 30% coverage by quarter without respect to target fishery or the time and area in which observer coverage is provided. Though analysis has shown that reliable estimates of target catch can be made at this level of coverage, the analysis assumes random placement of observers and would require that the level of coverage be 30% for specific target fisheries and shorter time periods than a quarter.

Finally, Option 1 does not provide any coverage of vessels less than 60 feet LOA. Though this portion of the fleet only accounts for about 3% of the catch, it does account for 22% of the fishing effort. Some of the larger vessels in this class are capable of carrying observers and may account for significant portions of the catch of particular groundfish and bycatch in certain fisheries. For example, vessels between 55 feet and 60 feet LOA have accounted for increasing portions of the Pacific cod trawl fishery in the Gulf of Alaska. The bycatch of halibut is a concern in this fishery.

Option 2, which would require 100% coverage of all vessels and plants which meet the minimum length or processing requirements would provide adequate sampling to meet all sampling objectives for the groundfish program. However, there are a number of disadvantages to this option.

First, it is estimated that 100% coverage would cost about $13.5 million which exceeds the total funding available from the 1% fee originally proposed, and would substantially raise the costs to the fleet of this Research Plan. To achieve this level of coverage, the fee percentage would have to be increased to a level approaching the 2% maximum now stipulated (likely around 1.6%, assuming no increases in coverage for the shellfish program).

A second disadvantage of Option 2 is the impact of the required level of coverage on the operating requirements of the fisheries and the safety observers and fishermen. There may be an increased risk of injury or death for observers on the smaller vessels if they are required to be aboard 100% of the time. This concern also applies to the fishermen if crew size is decreased to accommodate an observer. There are also considerations with the ability to deploy the needed number of additional observers (approximately 190 additional 3-month observer trips) and effectively manage deployment of observers to all vessels 100% of the time without adversely affecting the operations of these vessels. As with Option 1, the Council may want to evaluate the minimum length and processing requirements to possibly include portions of the industry not currently required to provide observer coverage.

The primary advantage of Option 3 is that the program could be fully funded through the Plan at a cost less than the current program ($4.1 million versus $8.6 million). The program could be constructed in a way which could likely provide reliable estimates of the catch of the various target species but very little could be done with the bycatches of other groundfish which occur in the target fishery and bycatches of prohibited species. It would not be possible to conduct an individual vessel incentive program. It would be possible to produce estimates of the bycatches of prohibited species but those estimates would not be reliable. This level of sampling would provide sufficient opportunity to collect biological data needed in stock assessment work. The Council may want to evaluate inclusion of vessels and plants not currently covered by the observer program, as suggested under Options 1 and 2.

2.3.4.2 Data bias due to presence of observers

Relative to a discussion of appropriate levels of coverage is the question of possible introduction of bias into the data being analyzed due to the presence of an observer on a vessel. The only data available, and the data upon which the analyses of the statistical reliability of observer data are based, are data collected from vessels when observers are on board. Inherent in an observer program where the data are used to manage the operations of the fishery, is the desire to alter the behavior of fishermen to remain within the guidelines of those management measures. Therefore, it may be reasonable to expect that operations and catches may differ between observed and non-observed vessels. Data are not available to make a quantitative determination of the extent of the difference, if any, or how to reconcile this difference. It is reasonable to assume that the observed data on such things as bycatch rates of prohibited species, mortality rates of discarded prohibited species, or the discard of unwanted or unusable catch represent minimum levels and that the rates of bycatch, mortality and discard may be higher on non-observed vessels. If it is believed that the bias is too large, the only way to resolve the problem is to increase the levels of observer coverage and sampling.

2.3.4.3 Alaska shellfish program

a. Initial levels of observer coverage under the North Pacific Fisheries Research Plan shall be that of the existing industry funded crab observer program.

   i. Presently 100% of all catcher/processors and floating processors are required to have an onboard observer to engage in the BS/AI crab fisheries.

   ii. ADF&G traditionally collected essential biological and management data at the point of shoreside landing immediately before processing. The rapid evolution to processing by catcher/processor and floating processor vessels in particular shellfish fisheries seriously eroded the department's ability to adequately monitor harvests to ensure sustained yield without overfishing. Onboard observers supply two critical functions, without which offshore processing would not be allowed.

      - They are the only practical data gathering mechanism which would not disrupt processing.
      - They provide the only effective means to ensure management compliance.

b. Pursuant to the Bering Sea and Aleutian Islands king and Tanner Crab FMP, the State of Alaska crab observer program has been designed by the Alaska Board of Fish and administered by the Alaska Department of Fish and Game. Future modifications to the crab observer program will be made through the board process, under general oversight of the Council, in accordance with the king and Tanner crab FMP.

Appendix III contains the analyses performed by ADF&G regarding institution of the mandatory shellfish observer program. These include statistical analyses of the data from the crab fisheries which resulted in the decision to institute the program. Follow up analyses support the levels of coverage now required under the shellfish observer program.

2.3.5 Observer employment and contracts

2.3.5.1 NMFS groundfish program

1. Observers will be either employees of NMFS, or be under contract to NMFS.

2. Observer contracts will be subject to a competitive bid process and will comply with federal and/or agency procurement regulations. If in accordance with procurement regulations, and if cost effective, multiple contractors will be used.

3. Observer deployment shall be determined by NMFS.

4. Observers must possess the education and specific training necessary to meet the requirements of the groundfish observer program.

2.3.5.2 Alaska shellfish program

1. Observers will be either employees of ADF&G, or be under contract to NMFS.

2. Observers for the Shellfish Observer Program obtained from contractors will be obtained through the NMFS observer contracts. Observer contacts will be subject to a competitive bid process and will comply with federal and/or agency procurement regulations. If in accordance with procurement regulations, and if cost effective, multiple contractors will be used.

3. Observer deployment shall be determined by ADF&G.

4. Observers will possess the education and specific training necessary to meet the requirements of the crab observer program.

2.3.6 Observer duties

2.3.6.1 NMFS groundfish program

1. collect data on catch, effort, bycatch, and discards of finfish and shellfish, including PSCs, and transmit required data to facilitate in-season management.

2. collect biological samples which may be used to determine species, length, weight, age and sex composition of catch and predator prey interactions;

3. collect data on incidental take of marine mammals, seabirds, and other species as appropriate;

4. other duties as described in the NMFS observer manual.

2.3.6.2 Alaska shellfish program

1. collect data on catch, effort, bycatch and discards of finfish and shellfish, and transmit required data to facilitate inseason management;

2. collect biological samples which may be used to determine species, length, weight, age and sex composition of catch;

3. collect data on marine mammals, seabirds, and other species as appropriate;

4. other duties as described in the ADF&G observer manual.

2.3.7 Coordination Between NMFS Groundfish Program and ADF&G Shellfish Program

1. Recognizing the differences in the missions between the ADF&G crab observer program and the NMFS groundfish observer program, but wishing to provide for the maximum efficiency in administration and implementation of the groundfish and crab observer programs, NMFS and ADF&G will form a work group to address the following:

   a. to the extent possible and practicable, development of consistent, cost effective, and compatible observer training and debriefing procedures.
   b. to the extent possible and practicable, development of a consistent data collection, transmission and processing system including a single data base available to both agencies on a real-time basis.
   c. identification of costs which are appropriate for reimbursement to the State pursuant to the MFCMA.

2. The University of Alaska, as an observer training entity, shall be included as an ex-officio member of the agency workgroup for the purposes of part 1.a.

   Recognizing industry concerns regarding administrative costs of the plan and possible funding shortfalls, direct the agency workgroups identified under 2.3.7 to review costs and identify possible cost savings measures, including the use of public or private contractors to perform some or all of the duties under the plan; as well as the costs and benefits of training groundfish observers in Alaska or elsewhere.

3. On an annual basis, NMFS and ADF&G will provide to the Council a report detailing steps taken to improve overall coordination between the two observer programs and to improve administrative efficiency.

2.3.8 Evaluation of Transition Period Options

As the Council considers the issues of a supplementary program and start-up funding for the Research Plan, they need to consider the timing in availability of funds that will result from the alternatives they have chosen as compared to the timing in availability of funds required by the agencies to implement and carry out the observer programs covered under the Research Plan. To this point, the Council has chosen a preferred alternative that requires payment of fees on a quarterly basis 30 days after each quarter is completed.

The agencies responsible for providing the observer coverage cannot spend or obligate the expenditure of funds that they do not yet have. This means that the funding necessary to cover agency observer program staff and contract observer trips for a quarter must be on deposit in the Observer Fund in the U.S. Treasury well before the start of the quarter. With a program where fees are paid after the fishery has taken place, yet the observer coverage must be made available at the time of the fishery, funds to cover six months of program operation will have to be on deposit and available at all times or the agencies will not be able to provide the required services.

Unless Congress provides a start-up appropriation of at least one-half or six months of the first year's program cost, the Council must provide a mechanism to build up the money on deposit in the Observer Fund. The options for accomplishing this are summarized below:

1. Receive Congressional appropriation for the necessary amount of money to be put on deposit in the Observer Fund. This is currently estimated to be the equivalent of six months worth of fees, or about $5 million.

2. Continue the current method of funding (industry paying directly to private contractors) while simultaneously collecting fees from those segments of industry covered by the Research Plan but who are not currently required to carry and pay for observers, until a balance of six months of funding is achieved.

3. Continue the current method of funding (industry paying directly to private contractors) while simultaneously collecting fees from everyone covered by the Plan, including those already paying directly for observers, until a balance of six months of funding is achieved.

4. **(PREFERRED ALTERNATIVE)** Continue the current method of funding (industry paying directly to private contractors) while simultaneously collecting fees from those segments of industry covered by the Research Plan but who are not currently required to carry and pay for observers, for the first twelve months after approval of the Plan. Additionally, those who do pay directly for observer coverage would be required to pay the difference between the amount they pay directly and the amount based on the established fee percentage, if the amount they pay directly is less than the fee percentage amount. For those whose direct payments are equal to or greater than the fee percentage amount, additional payments beyond their direct payments would not be required.

Option 1, for a Congressional appropriation, is beyond the direct authority of the Council. This option would solve the problems associated with start-up funding, and could be pursued through requests by the Council and industry, if this is a desire of the Council.

The advantage of Option 2 is that each operation would either pay contractors for observers or pay the fee but not both. One disadvantage is that the fee collection process would become more complex and costly, require much more information, and result in more operations being responsible for submitting fees. This would occur because for catch delivered for onshore processing; (1) it would be necessary to keep track of which catch was subject to observer coverage during the harvesting process and which was subject to observer coverage during processing and (2) it might be necessary to bill both vessels and processors accordingly.

Another disadvantage of Option 2 is that if a large part of the catch is accounted for by operations that pay directly for observers, the transition period could be up to two years (under a 1% fee) and the full advantages of the Plan would be postponed until the transition is completed, unless a fee of more than 1%

is assessed against catch not subject to observer coverage. In 1990 there was more than 75% observer coverage of groundfish harvesting and probably 90% coverage of groundfish processing. If it is assumed that there will be 80% coverage in terms of the exvessel value of harvesting and processing in 1992 and beyond, and if it is also assumed that fees to fund approximately 6 months of the Plan are required before the fees are used to pay for the Plan, the transition period would be about 2 years under a 1% fee, while a 2% fee would accumulate the necessary funds in 1 year. This includes payments by the uncovered portions of the crab and groundfish activity, as well as the halibut fisheries.

A disadvantage of Option 3 is that it results in double payments for some operations. Operations with observer requirements would pay contractors directly for observers and they would also pay the user fees. The advantages of Option 3 are that: (1) the costs of both having to keep track of which catch is subject to which fee and having to collect from vessels and processors are eliminated; and (2) the Plan can be fully implemented sooner.

With whatever option is chosen by the Council, the difficulties associated with the flow and availability of funds must be kept in mind and understood. One option available to the Council which would resolve the start-up funding problem would be to approve a Research Plan but stipulate within the Plan that it would not be implemented until Congressional action was taken to provide the necessary start-up funds. In the interim, the current groundfish and crab programs would remain in effect.

Table 2.3 illustrates the potential cash flow scenario in the absence of start-up funding and assessing a maximum 1% fee, originally under Council consideration. At the end of 18 months, there is a deficit funding balance of $5.46 million. This illustrates the fact that the program cannot commence until at least six months worth of fees are on deposit in the Observer Fund. Commitments of funding have to occur some time before actual receipt of the fees. Additionally, the actual value, and the fees associated with that value, may be different than the projections.

Option 4, the **PREFERRED ALTERNATIVE** adopted by the Council, stipulates a twelve month period for the collection of fees to accumulate necessary money in the Observer Fund. There is no guarantee that this twelve months will be enough time to accumulate the amount necessary to start the program. It will depend on two things: (1) if funds are appropriated by Congress, in which case the twelve month period may be enough or more than enough, and (2) the fee percentage established by the Council for the twelve month start-up period. Table 2.4 summarizes the estimated accumulation of start-up funds under three different fee percentage scenarios: (1) a 2% fee, which is the maximum allowable under the Plan, (2) a 1.13% fee, which is estimated to be the amount needed to fund current levels of observer coverage, and (3) **a 1.35% fee, which is estimated to be the amount necessary to accumulate the necessary start-up funds in twelve months, under Option 4.**

These figures were calculated based on estimates of fees which would be collected, above and beyond the direct payments made by vessels required to carry and pay for observers. It includes fees collected from vessels who do not carry observers, as well as fees from those who do carry observers but whose direct payments are less than the fee percentage shown. For example, the first column, labeled 'Direct Cost of Observers', represents the cost of coverage to those vessels currently required to have coverage. It does not include agency operational costs. The next two columns represent the total value of the fees (under the 2% scenario) and then the start-up funding that would result from imposing the 2% fee during the first twelve months of the program. The total start-up funds available under this scenario is $10.128 million, more than enough to get the program going.

Table 2.3 Analysis of expenditures and receipts from fees (cashflow) for the first 18 months of implementation and operation of the groundfish and shellfish observer programs under the North Pacific Fisheries Research Plan.

	Expenditures or Costs			Receipts			Net Balance	
Month	NMFS	ADF&G	Obser.	NMFS	ADF&G	Obser.	Month	Cumul.
Oct. 1	$1.71	$ 0.57	0	$1.35	0	0	-$ 0.93	-$ 0.93
Nov. 1	0	0	2.67	0	0	0	-2.67	-3.60
Dec. 1	0	0	0	0	0	0	0	-3.60
Jan. 1	0	0	0	0	0	0	0	-3.60
Feb. 1	0	0	2.24	0	0	0	-2.24	-5.84
Mar. 1	0	0	0	0	0	0	0	-5.84
Apr. 1	0	0	0	0	0	0	0	-5.84
May 1	0	0	1.67	0	0	2.68*	1.01	-4.83
Jun. 1	0	0	0	0	0	0	0	-4.83
Jul. 1	0	0	0	0	0	0	0	-4.83
Aug. 1	0	0	0.97	0	0	2.75*	1.78	-3.05
Sep. 1	0	0	0	0	0	0	0	-3.05
Oct. 1	1.70	0.57	0	1.35	0	0	-0.93	-3.98
Nov. 1	0	0	2.67	0	0	2.27*	-0.39	-4.37
Dec. 1	0	0	0	0	0	0	0	-4.37
Jan. 1	0	0	0	0	0	0	0	-4.37
Feb. 1	0	0	2.24	0	0	1.15*	-1.09	-5.46
Mar. 1	0	0	0	0	0	0	0	-5.46

*These values are based on 1991 quarterly ex-vessel values for groundfish, BS/AI crab, and halibut.

The same information is then provided for the 1.13% fee scenario and the 1.35% scenario. The scenario of 1.35% was chosen because that is the fee that would be necessary to accumulate the $5 million in necessary start-up funding, as is shown by the last figure in the table, $5.268 million. The 1.13% scenario produces a twelve month accumulation of $3.979 million, which is not enough to initially fund the program. Once the Research Plan is approved, the Council will have to decide on the appropriate fee percentage to establish for the twelve month start-up period. This decision will be affected by the likelihood of Congressional appropriation as well as consideration by the Council of how long they are willing to wait for the full Research Plan to become effective.

2.3.9 Evaluation of Options to Address Shortfalls in Funding

The estimated cost to carry out the groundfish portion of the Research Plan, based on current levels of observer coverage and 1992 cost projections, is $8.63 million as shown in Table A1 contained in Appendix I. This cost figure consists of $1.72 million in agency operational costs for the Alaska Fisheries Science Center (AFSC) and NMFS Alaska Regional Office. These costs are detailed in Table A2 from Appendix I. Another $6.9 million is budgeted for direct costs of hiring and placing observers. A detailed breakdown of the direct costs of this observer coverage is provided in Table A3, which includes the cost per observer month of both 100% and 30% coverage vessels. Based on 1992 projections, this cost is estimated to be $7,068 per month for 100% coverage vessels and $8,680 per month for the 30% coverage vessels.

Table 2.4 Estimated collection of fees during the first year of the North Pacifc Fisheries Research Plan to be used for Progam start-up funding.

Fishery	Vessel Type	Direct Cost of Observers ($ millions)	2% Fee ($ millions)	Start-up Funds under 2% Fee ($ millions)
Alaska Groundfish	Vessels < 600 Ft.	$0.000	$0.381	$0.381
	Vessels 60-124 Ft.	$2.092	$2.067	$0.000
	Vessels > 124 Ft.	$4.827	$7.912	$3.085
	TOTAL	$6.919	$10.360	$3.466
North Pacific Halibut	All Vessels	$0.000	$1.960	$1.960
BSA King & Tanner Crab	Catcher/Processor	$2.417	$1.222	$0.000
	Catcher Vessel	$0.000	$4.702	$4.702
	TOTAL	$2.417	$5.924	$4.702
All Fisheries TOTALS		$9.336	$18.244	$10.128

Fishery	Vessel Type	1.13% Fee ($ millions)	Start-up Funds under 1.13% fee ($ millions)	1.35% Fee ($ millions)	Start-up Funds under 1.35% Fee ($ millions)
Alaska Groundfish	Vessels < 60 Ft.	$0.215	$0.215	$0.257	$0.257
	Vessels 60-124 Ft.	$1.168	$0.000	$1.395	$0.000
	Vessels > 124 Ft.	$4.470	$0.000	$5.340	$0.513
	TOTALS	$5.853	$0.215	$6.993	$0.771
North Pacific Halibut	All Vessels	$1.107	$1.107	$1.323	$1.323
BSA King & Tanner Crab	Catcher/Processor	$0.690	$0.000	$0.825	$0.000
	Catcher Vessel	$2.657	$2.657	$3.174	$3.174
	TOTAL	$3.347	$2.657	$3.999	$3.174
All Fisheries TOTALS		$10.308	$3.979	$12.315	$5.268

The shellfish portion of the program is currently estimated to total an additional $2.98 million in costs (Table A5), again based on 1992 cost projections, of which $2.4 million is the direct cost of hiring and placing observers (326 months @ $7,414 per month) and $.58 million is agency operational costs. Table A6 provides a more detailed breakdown of the administrative and operational costs for the shellfish program. Table A7 provides estimates of the costs per month of hiring and placing observers. This cost varies depending on whether the observers are new or experienced, but the average is estimated to be $7,414 per month. The total cost of the combined groundfish and shellfish program is, therefore, $11.6 million.

Under the Research Plan, user fees may be used to pay for the costs of placing observers which are not covered by other federal funding sources. Estimated federal funding for the program is currently $1.35 million, which is then subtracted from the total cost figure of $11.6 million to arrive at a recoverable cost figure of $10.26 million. This is the amount of cost which the Research Plan allows to be recovered through the fee program. The total value of all plan fisheries (based on most recent landings and value estimates from the 1991 fisheries and summarized in Table 2.1) is $912.2 million. For purposes of evaluating potential shortfalls, let us summarize the effects of a fee based on **1%** of the exvessel value, the cap which was initially under consideration. The amount of fee collected would be $9.12 million under this scenario.

Estimated Cost of Groundfish Program	$8.630	million
Estimated Cost of Shellfish Program	+ 2.980	million
Total Cost	11.610	million
Less Federal Funding	- 1.35	million
Recoverable Cost	10.260	million
Estimated Revenue from 1% Fee	- 9.120	million
Shortfall	$ 1.140	million

In the situation described above, there is a shortfall in funding for the Research Plan of $1.14 million. Had there been a surplus of funding, the result would be a reduction of the fee in the subsequent year to a percentage of less than 1. However, under the mechanisms of the Research Plan, there is no guarantee that full funding will occur upon implementation of the Plan. Even assuming that the cost projections remain constant, there may be variations in catch and value of catch which could result in either additional surpluses or, shortfalls in funding. If observer coverage levels need to be increased above their current levels to achieve the objectives of the program, then there will almost certainly be a shortfall situation in the flow of funds. Table A8 in Appendix I provides a range of cost projections under various scenarios of observer coverage levels. The current situation is depicted by the 62% overall level of coverage. If, for example, coverage levels are increased to 80% overall, then the overall cost of the groundfish portion of the program increases to $10.78 million (it is assumed that coverage levels in the shellfish program would remain at their current levels). The overall cost of the Research Plan under this scenario would increase to $13.76 million ($10.78 plus $2.98 million, the cost of the shellfish program). The funding shortfall under this scenario (assuming a 1% of exvessel value fee assessment) is summarized as follows:

Estimated Cost of Groundfish Program	$ 10.78	million
Estimated Cost of Shellfish Program	+ 2.98	million
Total Cost	13.76	million
Less Federal Funding	- 1.35	million
Recoverable Cost	12.41	million
Estimated Revenue from 1% Fee	- 9.12	million
Shortfall	$ 3.29	million

The preceding examples are provided to illustrate why the Council ultimately decided to increase the fee percentage to up to 2% of exvessel value. This change has been made to the Magnuson Act authorization language for the Research Plan and is the intent of the Council. The Council was faced with the following options to deal with potential shortfalls in funding:

1. **(PREFERRED ALTERNATIVE)** Have Congress increase the fee to greater than 1%. This option would eliminate the probability of a funding shortfall.

2. Reduce the levels of coverage to conform to the budget constraints which exist under the 1% fee cap.

3. Establish a supplemental observer program in conjunction with the Research Plan.

Option 1 would, of course, eliminate the problem of a funding shortfall given current estimates of catch, value, and program costs. The amount to which the fee cap would need to be increased will depend on the levels of coverage which are determined to be necessary to accomplish the objectives of the Research Plan. Under a full 2% of exvessel fee, the funds available would be much more than necessary to cover the anticipated costs of the program, even with an increase in observer coverage levels. Under a full 2% fee, the funding excess would be approximately $8 million. Current estimates indicate that the fee percentage necessary, based on current levels of coverage in the groundfish and shellfish programs, is **1.13%**. Because of fluctuating harvest levels, fluctuating fish prices, and the possibility of increased observer coverage levels, it is unlikely that this 1.13% will remain constant in the future. It is likely that the fee would rise to some level above 1.13%, but in no circumstance could the fee exceed 2% of exvessel value. It is also possible, if coverage levels do not increase significantly, that the fee percentage could be lower than 1.13%, depending on fish landings and prices.

The fee percentage to be assessed will be evaluated by the Council, with input from the Observer Oversight Committee, on an annual basis. Desired coverage levels, estimated costs of those coverage levels, and estimated revenues from the fisheries will factor into the determination of the fee percentage. Landings and revenues from the 1991 fisheries were used in this analysis as they represented the best current information available. Updated landings and price information will go into the annual review process under the Research Plan. This process is detailed in the 'Fee Assessment' discussion, Section 2.3.2 of this document. It is also contained in Section 2.9, the Council's final **Overall Preferred Alternative** for the North Pacific Fisheries Research Plan.

The following discussion was included in this analysis before the fee limit was increased to up to 2% of exvessel value. Though this discussion may no longer be relevant, it is included here for comparison and to illustrate the difficulties facing the program had the fee limit not been increased.

Under Option 2, levels of observer coverage would be adjusted to conform to the funds available. No reductions from current levels would be necessary, given the current estimates of costs and fee collections. Such an adjustment could be necessary if costs of the program increase or if there is a sufficient reduction in either catch of Plan fisheries or exvessel value of those fisheries. Section 2.3.4 contains a discussion of observer coverage levels necessary to accomplish the stated objectives of the Research Plan. If this alternative is chosen, both the Council and NMFS will be required to continuously determine if observer coverage needs to be modified to remain within the levels of collected fees.

Option 3 would require a supplemental program to pay for observer costs if the required levels of observer coverage are greater than can be funded under the 1% Research Plan fee. This situation could occur and be identified through the annual process of determining the program cost and setting of the fee or it could occur during the fishing year if the actual ex-vessel prices paid for fish and shellfish were less than those projected. If it is important for the Council and agencies involved to maintain their designated levels of observer coverage, a supplemental program where the unfunded portions of the program are paid for by industry would be required.

The supplemental program would be similar to the program now in place for the groundfish and crab programs where industry pays for the cost of the observers directly to observer contractors. Unlike the present programs, though, a supplemental program could be structured in a way which would minimize the problems experienced under the current programs. This could be done by structuring the program so that only those contractors holding a federal government contract for observers for these fisheries could be used; requiring that placement and deployment of observers be controlled by NMFS and ADF&G as done under the government contracted portion of the program; limiting the cost of observers to vessel and processor owners to the same as was set in the government contracts; and, requiring that a copy of all invoices and transactions between the contractors and owners be submitted to the government as part of their oversight of the program.

The most difficult part of a supplemental program under the proposed Research Plan is determining the segments of the industry that would pay and how the program would be integrated into the Research Plan's fee program during the year. As far as who pays, it appears that the only alternative would be for those required to carry the observers to pay for the unfunded portion of required observer time. Since payment of fees would occur on a quarterly basis, the supplemental program would have to be utilized on a quarterly basis to cover the unfunded portion of costs for that quarter. Essentially all vessels and plants carrying observers during the quarter would have to fund that portion of their observer costs not covered by the collection of fees.

An additional issue relative to a potential supplemental program is the method that will be used to determine what observer coverage will be funded under the Plan and what coverage will be funded via the supplemental program. Although there are a large number of methods that can be used, only two methods are considered below. The merits of each method depend in part on the extent to which the problems associated with the current method of funding are avoided.

Method 1 If it is determined that the user fees can, for example, fund only 80% of the desired observer coverage, the fees could be used to fund the first 80% of observer coverage during the year and the supplemental program could fund the coverage during the remainder of the year. This would not result in a seasonally equitable distribution of observer program costs, but it would be reasonably simple to administer. It could result in a redistribution of fishing effort away from the end of the year when most of the cost of observer coverage would be paid for directly by the operations required to have observers. The problems associated with the potential conflict of interest and the lack of control of the observer program would continue but only during the part of the year that the supplemental program was in effect.

Method 2 An alternative would be to have the user fees fund 80% of the observer coverage requirements of each operation each day and let the operations required to have observers fund the other 20% coverage. The operations with observer requirements cannot be required to provide the NMFS or the NMFS contractors with the supplemental funds. However, with this method, most operations would voluntarily choose to pay the NMFS contractor to provide the observer for the balance of each observer day. They would do so because this would be the least costly way for them to obtain the supplemental coverage that would be required to meet their coverage requirements.

With respect to the Plan paying the same percentage of the cost of observer coverage of each operation, this would be an equitable method of implementing a supplemental observer program. However, compared to a program that is fully funded by the fees, any supplemental program retains the equity problems associated with the current observer program. But having 80% of the program equitably funded is an improvement compared to the status quo.

There are two additional benefits of this method of implementing the supplemental program. It would tend to reduce the potential for a conflict of interest between the operation and either the observer contractor or the observer because in most instances the operator will have a significant advantage if it uses the observer that is already there. It would also decrease the lack of control of the observer program that currently occurs because there are a large number of certified contractors and because they are not governed by contracts with NMFS.

2.4 Reporting Costs

Alternative 1, the status quo, would not require a change in reporting requirements or costs. Alternative 2 would require improvements to the State fish ticket system or additional reporting requirements for all processors receiving fish from plan fisheries. Neither would be expected to impose a substantial reporting cost on processors. The information to be reported is already maintained by the processors for their own business purposes. Alternative 2 may also require additional costs to processing operations in the form of securing a bond to cover the amount of the projected fee liability. At an average cost of 2% of the face value of the bond, this is not expected to be a significant increase in costs to the processing operations.

2.5 Administrative, Enforcement, and Information Costs

Alternative 1 would not change administrative, enforcement, and information costs. Alternative 2 would increase these annual costs by approximately $0.66 million if enforcement is included, or $0.36 million if enforcement is excluded. Half of this would be the cost of meeting the increased responsibilities that the NMFS would have to manage the observer program. The other half would be the cost of implementing the system of user fees. The latter includes the cost of obtaining the information necessary to establish the fee and calculate fee liabilities for processors. It also includes the cost of collecting the fees and administering the North Pacific Fishery Observer Fund.

2.6 Impacts on Consumers

The choice that is made between these two alternatives is not expected to have a measurable effect on consumers. The differences in neither the cost of the required observer coverage nor the redistribution of that cost is expected to result in a measurable change in the quantities of seafood products available to consumers or the prices of these products.

2.7 Distribution of Benefits and Costs

Compared to Alternative 1, Alternative 2 is expected to result in what many would consider a more equitable distribution of the cost of meeting the current observer requirements for the groundfish fisheries. It is also expected to increase the ability of the NMFS to effectively manage the observer program and to eliminate a conflict of interest that could decrease the credibility of observer data. These benefits will be accompanied by a $0.66 million increase in the cost of the observer program including fee collection costs. The redistribution of costs will be from observed operations that would otherwise bear a disproportionately large part of the cost of the observer program to those who would otherwise pay for none or a disproportionately small part of that cost.

2.8 Physical and Biological Impacts

The alternatives are not expected to have a direct effect on the quality of the human environment. However, alternative 2 is expected to have a positive indirect effect by increasing the ability of NMFS to effectively manage the observer program and by eliminating a potential conflict of interest. Alternative 2 is expected to eliminate questions about the credibility and quality of data from the observer program and result in more informed management decisions, which in turn should reduce the potential for environmentally adverse effects of such decisions. The probability that Alternative 2 would result in less well informed decisions being made and, thereby, have an overall adverse effect on the environment is very low.

The primary difference between Alternative 1 and Alternative 2 lies in the funding mechanism for the observer program. Requirements for observer coverage levels will likely either stay the same or increase under Alternative 2.

2.9 Elements of the North Pacific Fisheries Research Plan (OVERALL Preferred Alternative)

A summary of the provisions of the proposed Research Plan, as adopted by the Council on June 28, 1992, is provided in this section. This constitutes the Council's **PREFERRED ALTERNATIVE** for the North Pacific Fisheries Research Plan.

A. Objectives:

1. To provide a framework for developing an observer program for the Alaska groundfish fishery, and halibut fisheries, which has the capability to perform inseason management, to accommodate status of stocks assessment and to provide accurate, real-time data of sufficient quality to implement an individual vessel incentive program. In the context of this Plan, the term groundfish is meant to include the halibut fisheries as well.

2. To provide a framework for developing an observer program for Bering Sea/Aleutian Islands king and Tanner crab fisheries which accommodates inseason management needs, ensures management compliance, and provides for the collection of biological and management data necessary to achieve the sustained yield of the crab resource without overfishing.

3. To ensure that the groundfish and crab observer programs are efficient and cost effective, that any increased costs are commensurate with the quality and usefulness of the data to be derived from any revisions to the programs, and that such changes are necessary to meet fishery management needs.

4. To provide for cooperation and coordination between the groundfish observer program administered by the NMFS and the crab observer program administered by the Alaska Department of Fish and Game (ADF&G).

B. Elements of the NMFS Groundfish (Halibut) Observer Program:

1. Level of coverage:

   a. Levels of observer coverage may vary by fishery and vessel size depending upon the objectives to be met for each fishery. This applies to all fisheries under North Pacific Fishery Management Council (Council) FMP jurisdiction and includes possible coverage for vessels participating in the halibut fisheries. Various levels of observer coverage, which are necessary to maintain statistical reliability, will be identified for each of the stated objectives of the Research Plan. The Council will review this and other relevant information on an annual basis to determine appropriate coverage levels given the available funds as well as the objectives of the program.

b. Changes to the groundfish observer program to improve the accuracy and availability of observer data may be implemented by the Alaska Regional Director (NMFS) upon recommendation by the Council based on one or more of the following:

(i) a finding that there has been, or is likely to be, a significant change in fishing methods, times, or areas for a specific fishery or fleet component;

(ii) a finding that there has been, or is likely to be, a significant change in catch or bycatch composition for a specific fishery or fleet component;

(iii) a finding that such modifications are necessary to improve data availability or quality in order to meet specific fishery management objectives.

(iv) a determination that any increased costs are commensurate with the quality and usefulness of the data to be derived from any revised program, and are necessary to meet fishery management needs.

2. Observer employment and contracts:

a. Observers will be either employees of NMFS, or be under contract to NMFS.

b. Observer contracts will be subject to a competitive bid process and will comply with federal and/or agency procurement regulations. If in accordance with procurement regulations, and if cost effective, multiple contractors will be used. A minimum of three contractors will be used if there are three or more qualified bidders.

c. Observer deployment shall be determined by NMFS. The agency may require vessels, on a quarterly basis, to file fishing plans for the upcoming quarter. This requirement will enable NMFS to estimate the effort in each target fishery ahead of time and plan for the necessary observer coverage by fishery.

d. Observers must possess the education and specific training necessary to meet the requirements of the groundfish observer program as specified in the contracts issued by the federal government to provide observers.

3. Duties of observers:

a. collect data on catch, effort, bycatch, and discards of finfish and shellfish, including PSCs, and transmit required data to facilitate in-season management.

b. collect biological samples which may be used to determine species, length, weight, age and sex composition of catch and predator prey interactions;

c. collect data on incidental take of marine mammals, seabirds, and other species as appropriate;

d. other duties as described in the NMFS observer manual, available from the Alaska Fisheries Science Center.

4. Data collection, transmission, and input programs shall be implemented according to the following:

a. initial implementation shall be as specified under existing regulations and guidelines which implement the Observer Plan.

b. When the Research Plan takes effect, the Regional Director, NMFS Alaska Region, shall review fishery monitoring programs and report to the Council on methods to improve data collection and sampling techniques, provide for real time data transmission from the fleet including daily reporting, and other measures as appropriate to improve the accuracy and efficiency of fishery monitoring programs.

C. Elements of the ADF&G Shellfish Observer Program:

The State of Alaska Shellfish Observer Program will be incorporated within the provisions of the Research Plan and its costs will be paid for by fees collected from Research Plan fisheries (listed in Section F.1).

1. Level of Coverage:

a. Initial levels of observer coverage under the North Pacific Fisheries Research Plan shall be that of the existing industry funded crab observer program.

i. Presently 100% of all catcher/processors and floating processors are required to have an onboard observer to engage in the BS/AI crab fisheries.

ii. ADF&G traditionally collected essential biological and management data at the point of shoreside landing immediately before processing. The rapid evolution to processing by catcher/processor and floating processor vessels in particular shellfish fisheries seriously eroded the department's ability to adequately monitor harvests to ensure sustained yield without overfishing. Onboard observers supply two critical functions, without which offshore processing would not be allowed.

- They are the only practical data gathering mechanism which would not disrupt processing.
- They provide the only effective means to ensure management compliance.

b. Pursuant to the Bering Sea and Aleutian Islands King and Tanner Crab FMP, the State of Alaska crab observer program has been designed by the Alaska Board of Fisheries (Board) and administered by the Alaska Department of Fish and Game. Future modifications to the crab observer program may be made through the Council/Board process, in accordance with the king and Tanner crab FMP.

2. Observer employment and contracts:

   a. Observers will be either employees of ADF&G, or be under contract to NMFS.

   b. Observers for the Shellfish Observer Program obtained from contractors will be obtained through the NMFS observer contracts. Observer contacts will be subject to a competitive bid process and will comply with federal and/or agency procurement regulations. If in accordance with procurement regulations, and if cost effective, multiple contractors will be used. A minimum of three contractors will be used if there are three or more qualified bidders.

   c. Observer deployment shall be determined by ADF&G.

   d. Observers will possess the education and specific training necessary to meet the requirements of the crab observer program as specified in the contracts issued by the federal government to provide observers.

3. Duties of observers:

   a. collect data on catch, effort, bycatch and discards of finfish and shellfish, and transmit required data to facilitate inseason management;

   b. collect biological samples which may be used to determine species, length, weight, age and sex composition of catch;

   c. collect data on marine mammals, seabirds, and other species as appropriate;

   d. other duties as described in the ADF&G observer manual.

4. Data collection, transmission, and input programs shall be implemented according to the following:

   a. initial implementation shall be as specified under existing regulations and guidelines to facilitate inseason management at the Dutch Harbor and Kodiak offices;

   b. ADF&G shall review their fishery monitoring and data transmission programs in conjunction with the NMFS, to help develop coordinated methods to improve data collection and sampling techniques, provide for real time data transmission from the fleet including daily reporting, and other measures as appropriate to improve the accuracy and efficiency of fishery monitoring programs and improve coordination between agencies.

D. Observer Oversight Committee

This Research Plan provides for the establishment of an Observer Oversight Committee to provide advice to the Council and the Regional Director of NMFS on general provisions of the observer and fee portions of the North Pacific Fisheries Research Plan. This Committee shall review reports and budgets required under provisions of this Plan and will provide input to the Council, within the annual cycle described in this Plan, on fee levels and observer coverage needs. The Committee will not have oversight of the daily operations of the Observer Program. The Chairman of the Council will appoint 11 members to the Committee to include industry representatives from the following groups: factory trawler, catcher trawler, shoreside processor, crab catcher vessel, freezer longliner, non-freezer longliner, crab catcher/processor, under 60' vessels, observers, observer contractors, and an independent observer training representative.

E. Coordination Between the NMFS Groundfish Program and the ADF&G Crab Observer Program:

1. Recognizing the differences in the missions between the ADF&G crab observer program and the NMFS groundfish observer program, but wishing to provide for the maximum efficiency in administration and implementation of the groundfish and crab observer programs, NMFS and ADF&G will form a work group to address the following:

   a. to the extent possible and practicable, development of consistent, cost effective, and compatible observer training and debriefing procedures.

   b. development of a consistent data collection, transmission and processing system including a single data base available to both agencies on a real-time basis.

   c. identification of costs which are appropriate for reimbursement to the State pursuant to the MFCMA.

2. The University of Alaska, as an observer training entity, shall be included as an ex-officio member of the agency workgroup for the purpose of part E.1.(a) above. Recognizing industry concerns regarding administrative costs of the plan and possible shortfalls under the 2% formula, direct the agency workgroup identified above to review costs and identify possible cost savings measures, including the use of public or private contractors to perform some or all of the duties under the plan, as well as the costs and benefits of training groundfish observers in Alaska or elsewhere.

3. On an annual basis, NMFS and ADF&G will provide to the Council a report detailing steps taken to improve overall coordination between the two observer programs and to improve administrative efficiency.

F. Fee Assessment:

The North Pacific Fisheries Research Plan fee assessment program will be based on the following:

1. Fisheries subject to fee assessment (Plan Fisheries);

   a. Gulf of Alaska groundfish.

   b. Bering Sea and Aleutian Islands groundfish

   c. North Pacific halibut (Bering Sea/Aleutians Islands and Gulf of Alaska fisheries)

   d. Bering Sea and Aleutian Islands King and Tanner crab

2. Fees will be assessed at up to 2% of exvessel value of fish and crab harvested in the fisheries identified above. Fee will be expressed and assessed on the basis of exvessel value. Though the potential maximum fee is prescribed by the Magnuson Act, the actual maximum for any given year may be less after determining the cost of the Plan and after deducting funds from other sources, if required.

The fee percentage limit identified above will sunset three years after implementation of the Research Plan. Unless changed or reestablished by the Council, the funding mechanism would revert to direct payment, by vessels and processors, for required observer coverage levels.

3. Fees from the program may only be used to pay for: (1) stationing observers including the direct costs of training, placing, maintaining, briefing, and debriefing observers; (2) collecting, verifying, and entering collected data (not manipulating data); (3) supporting an insurance risk-sharing pool; and (4) paying the salaries of personnel to perform these tasks. The fees cannot be used to pay administrative overhead or other costs not directly incurred in carrying out the Plan, or to offset amounts authorized under other provisions of law.

4. All plan fisheries will contribute to the total value of the fisheries; NMFS, in consultation with the Council and ADF&G, will use the best information available to project the value of fisheries. The factors that will be taken into account include but are not limited to: average prices for species or species groups, product forms, discards, and other factors during the year preceding the year for which the fee is being established, anticipated changes in the coming year, and projected catch based on expected harvest in plan fisheries. These projected values will be subjected to public review.

5. Annually the Regional Director, in consultation with the Council and ADF&G, will establish a fee percentage taking into account the value of the plan fisheries, the costs of implementing the Plan, other sources of funds, and limitations on the total amount that can be collected. This will be done concurrent with Council approval of observer needs of the fisheries. This annual process will be completed by the time the fisheries commence. The fee will be expressed as a percentage of the exvessel value of the fisheries. The reports and budget documents outlined in this Plan shall be provided annually to the Council a month prior to its June meeting. The Observer Oversight Committee established by the Council shall review these budgets and reports and provide a recommendation to the Council at the June meeting. The Council will review the Committee's recommendation and take final action in September.

   NMFS's budget for implementing the groundfish (halibut) portion of the observer program shall include:

   (i) costs for observer training and certification;

   (ii) costs for stationing observers on board fishing vessels and United States fish processors, including travel, salaries, benefits, insurance;

   (iii) costs for data collection, transmission, and input;

   (iv) contract services and general administrative costs (though these are not covered by the Research Plan fee).

   ADF&G's budget for implementing the crab observer program shall include:

   (i) costs for observer training and certification;

   (ii) costs for stationing observers on board crab vessels or at shoreside processors including travel, salaries, benefits, insurance;

(iii) costs for data collection, transmission, and input;

(iv) contract services and general administrative costs (though these are not covered by the Research Plan fee).

6. NMFS, with the assistance of ADF&G, will provide an estimate of the costs of providing required observer coverage for the groundfish and shellfish programs for the coming year based on anticipated observer coverage and the anticipated costs of the activities listed under Item F.3 above, including any additional costs of utilizing observers.

7. NMFS will provide an estimate of surplus funds in the North Pacific Observer Fund and estimate the amounts of funds that may be available from other sources.

8. The fees shall be set such that the total amount of fees collected are not expected to exceed the limitation prescribed by the Magnuson Act.

9. The user fee percentage for the coming year will be the total amount to be collected divided by the exvessel value of the plan fisheries, multiplied by 100. This fee will be established before the fishing year to which it will apply. It will be subject to Council and public review before being finalized.

10. The State of Alaska will be reimbursed for all of the costs of the crab observer program which are allowable under the MFCMA from fees collected under the North Pacific Fisheries Research Plan, consistent with provisions of the Research Plan.

11. When an accurate, reliable, and equitable method of measuring discards is developed and implemented, they may be assessed the fee under the Research Plan. This would not include required discards or discards that are alive. The value to assign assessed discards will be determined at an appropriate time in the future.

G. Fee Collection

Although fees are assessed against all fishing vessels and fish processors, they are collected from fish processors participating in plan fisheries. Fish processors are defined in the Magnuson Act; however, their operating characteristics fall into one of two categories. Processors are in Category A when they purchase unprocessed fish, that is when there is a documented commercial transaction between independent parties. Processors are in Category B when they obtain fish without such a transaction. For purposes of collecting fees, harvesting vessels are considered Category A processors when they sell directly to any entity other than a federally permitted processor under this plan.

1. Estimation of exvessel prices and fee liability

a. Category A Processors: It is assumed that these processors weigh or otherwise directly determine the amount of all fish delivered. Their fee liability is the product of the fee percentage established by NMFS for the calendar year, average exvessel price paid to the fisherman, and the amount of fish received. In addition, fees may be required on discards as described above. Fee liability will be divided equally between the processor and fisherman.

b. Category B Processors: If these processors weigh or otherwise directly determine the amount of their catch, then those documented amounts will be used to estimate fee liability. Otherwise, product recovery rates published by NMFS will be used to estimate retained catch. Their fee liability is the product of the fee percentage established by NMFS for the calendar year, an exvessel price as estimated and published by NMFS, and the estimated retained catch. The price estimates provided by NMFS will be based on price data from Category A Processors, taking into consideration the species mix, quarter of the calendar year, area, and other appropriate factors. In addition, fees may be required on discards as described above.

For both Category A and Category B processors, the exvessel price against which to apply the fee will be calculated each year based on average price information, across all Category A processors and across all product forms for each species or species group, from the previous 12 month period. This standardized price will be the basis for calculating each quarterly payment.

2. Fee payments will be made quarterly within 30 days of the end of the quarter to the NOAA Office of the Comptroller to be deposited in the North Pacific Observer Fund within the U.S. Treasury. The fee will be documented in a manner prescribed by NMFS.

3. All processors as defined under Item G(1) above may be required to have a federal permit to receive fish from plan fisheries. Processors must apply for these permits annually by the deadline prescribed by the Regional Director. Permits would be issued annually on January 1 to those processors whose fee payments are current. The NOAA Office of the Comptroller shall assess late charges for underpayment or late payments of fees.

   In order to cover anticipated fee liabilities, a bond or letter of credit, in an appropriate amount, will be required of each processor who receives plan fisheries fish (this includes dockside sellers who, in effect, become processors). The amount of the bond or letter of credit would be equal to the greatest anticipated quarterly fee for the upcoming calendar year. This bond or letter of credit would be in place for the entire year. A lien on property may also be included as assurance for payment of fee liabilities. Prepayment of fees by a processor would remain an option to the bonding, or letter of credit, process.

START-UP FUNDING

In order to accumulate necessary start-up money in the Observer Fund, an appropriate fee percentage will be calculated and, for the first year after Secretarial approval of the Research Plan, applied to all segments of industry covered by the Research Plan. The existing Observer Plan and its coverage requirements will remain in effect during this start-up period. All segments of industry who do not pay directly for observer coverage (for example vessels under 60 feet, vessels in the halibut fisheries, and crab catcher vessels) will pay this percentage as described above. Those who do pay directly for observer coverage will be required to pay the difference between the amount they pay directly and the amount based on the fee percentage, if the amount they pay directly is less than the fee percentage amount. For those whose direct payments are equal to or greater than the fee percentage amount, additional payments beyond their direct payments will not be required.

FUNDING SHORTFALLS

In the event of a funding shortfall after implementation of the Research Plan, the available funds will be utilized according to the prioritized list of Research Plan objectives as follows:

(1) Stock assessment
(2) In-season management
(3) Bycatch monitoring
(4) Vessel incentive programs

3.0 CONSISTENCY WITH OTHER APPLICABLE LAW

3.1 Effects on Endangered Species and Marine Mammals

None of the alternatives would constitute actions that would effect endangered species or their habitat within the meaning of regulations implementing Section 7 of the Endangered Species Act of 1973. Thus, consultation procedures under Section 7 on the final actions and their alternatives will not be necessary. None of the alternatives is expected to have effects on marine mammals occurring in the waters off Alaska.

3.2 Coastal Zone Management Act

Each of the alternatives would be conducted in a manner consistent, to the maximum extent practicable, with the Alaska Coastal Management Program within the meaning of Section 307(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

3.3 Executive Order 12291

Executive Order 12291 requires that the following three issues be considered:

(a) Will the proposed program have an annual effect on the economy of $100 million or more?

(b) Will the proposed program lead to an increase in the costs or prices for consumers, individual industries, Federal, State, or local government agencies or geographic regions?

(c) Will the proposed program have significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of U.S. based enterprises to compete with foreign enterprises in domestic or export markets?

Regulations do commonly impose costs and cause redistribution of costs and benefits. If the proposed regulations are implemented to the extent anticipated, these costs are not expected to be significant relative to total operational costs.

The user fee program will not have significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of U.S. based enterprises to compete with foreign enterprises in domestic and export markets. While payment of user fees will increase costs for some fishing and processing operations it will decrease costs for others. The total fees that can be collected cannot exceed 1% of the exvessel value of the plan fisheries. Therefore, for the plan fisheries as a whole, the fees will be substantially less than 1% of the first wholesale value of its seafood products.

The proposed program should not lead to a substantial increase in the price paid by consumers, local governments, or geographic regions since no significant quantity changes are expected in the seafood markets resulting from implementation of the user fee program.

This user fee program will have an annual effect of substantially less than $100 million, since it will not collect funds in excess of 1% of the exvessel value of the plan fisheries (valued at less than $1 billion), and since the total value of the catch of the plan fisheries is not expected to change as a result of the collection of user fees.

3.4 Regulatory Flexibility Act

The Regulatory Flexibility Act requires that impacts of regulatory measures imposed on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions with limited resources) be examined to determine whether a substantial number of small entities will be significantly impacted by the proposed measures. Fishing vessels are considered to be small businesses, and processors may fit into this category as well. More than 2,000 vessels may fish for groundfish, halibut, and crab off Alaska in 1992 and beyond. Because of the number of operations involved, this Research Plan could result in significant economic impact on a substantial number of small entities.

3.5 Title 9701 (B)

Title 9701 (B) of the U.S. Code Annotated, Chapter 31, requires an assessment of the value of services received compared to the charges of those services. Specifically, the section states that each such charge shall be:

1. fair, and
2. based on:
   (A) the costs to the government
   (B) the value of the service to the recipient
   (C) public policy or interest served
   (D) other relevant facts

The proposed Research Plan would result in a method of funding for the observer program that has been determined to be more fair than the current system whereby some participants in the fishery pay directly for their required observer coverage. The value of the service, in this case observer coverage, is directly related to the public policy or interest served. It has been determined by the Council, with the overwhelming support of the fishing industry, that an observer program is vitally necessary to provide the information crucial to fisheries management. The information gained through the observer program is necessary for monitoring the directed catch of fish off Alaska, bycatch of prohibited species, interactions with marine mammals, and overall conservation of the resources under the jurisdiction of the Council.

3.6 Finding of No Significant Impacts

For the reasons discussed above, neither implementation of the status quo nor any of the alternatives would significantly affect the quality of the human environment, and the preparation of an environmental impact statement on the final action is not required by Section 102(2)(c) of the National Environmental Policy Act or its implementing regulations.

Assistant Administrator for Fisheries   Date

4.0 COORDINATION WITH OTHERS

The preparers consulted extensively with representatives of the North Pacific Fishery Management Council and its Data Committee, National Marine Fisheries Service, NOAA Comptroller's Office, Pacific Marine States Fisheries Commission, Alaska Department of Fish and Game, and members of the fishing industry.

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APPENDIX I

Projected Agency Costs for Implementing

the North Pacific Fisheries Research Plan

Table A1 Estimated cost for domestic groundfish observer program. Cost estimates are for a program at the same level of coverage as the current industry funded program (Refer to Tables 2, 3 and 4 for details on NMFS program costs and average cost/observer-month).

A. Estimated direct observer costs of vessels, motherships & plants covered at the 100% and 30% levels of observer coverage:

100% vessels, motherships, & processors: 683 Mo. X $7,068 = $4,827,444
30% vessels, motherships, & processors: 241 Mo. X $8,680 = $2,091,880
Total estimated effort and cost needed: 924 Obsrver Mo. = $6,919,324

B. Estimated NMFS operational costs.

NMFS Regional and Science Center cost: $1,710,900

C. Total estimated cost for program: $8,630,224

Table A2 Estimated agency costs ($1,000's) for domestic groundfish observer program. These cost are currently provided for by federal funding.

A. Alaska Fisheries Science Center

COST ELEMENTS	PROGRAM OPERATIONS	TRAINING[1/] & GEAR	DEBRIEFING	DATA MNGT.	TOTAL
	PROGRAM ELEMENTS				
LABOR	$ 205.4	$ 113.7	$ 194.7	$ 344.9	$858.7
(NO. OF STAFF)	(7)	(5.2)	(10)	(17.3)	(39.5)
BENEFITS	38.5	21.3	36.5	64.7	161.1
OTHER COMPENSATION	0.0	5.0	33.6	10.0	48.6
TRAVEL	30.0	-	-	-	30.0
TRANSP.	0	5.0	-	-	5.0
RENTS/COMMUN./ UTILITIES	75.0	-	-	-	75.0
PRINTING	-	15.0	-	-	15.0
CONTRACTS	40.0	40.0	-	90.0	170.0
SUPPLIES/ EQUIPMENT	-	215.0	-	-	215.0
OTHER	-	-	-	-	0.0
TOTAL	$ 388.9	$ 415.0	$ 264.8	$ 509.6	$1,578.3

1/ Training and Gear category includes cost for purchase and maintenance of sampling and safety equipment and gear for all observer trips.

Table A2 Continued

B. Alaska Regional Office

PROGRAM ELEMENTS

COST ELEMENTS	PROGRAM OPERATIONS	TRAINING[1/] & GEAR	DEBRIEFING	DATA MNGT.	TOTAL
LABOR	$ 68.5	-	-	-	$68.5
BENEFITS	29.3	-	-	-	29.3
OTHER COMPENSATION					
TRAVEL	5.0				5.0
TRANSPORTATION					
RENTS/COMMUN./ UTILITIES	14.8				14.8
PRINTING					
CONTRACTS					
SUPPLIES/ EQUIPMENT	15.0				15.0
OTHER					
TOTAL	$ 132.6	-	-	-	132.6

Table A3. Estimated average costs per observer month for domestic groundfish observers in Alaska (based partially on input from observer contractors)

Average Observer Costs - 3 Month Deployment

Cost Item	100% Vessels Cost/Month	30% Vessels Cost/Month
Observer Salaries[1]	$3,370	$3,370
Benefits (12.5%)	421	421
Insurance (28%)[2]	945	945
Sub-Total cost	$4,736	$4,736
Travel		
Air fare[3]	$ 440	$ 500
Per diem[4]	135	1,305
Excess baggage	50	50
Physical exam[5]	25	25
Contractor's services (25%)	1,346	1,654
Profit or Fee (5%)	37	410
Total	$7,068	$8,680

1/ Average observer salary per month is prorated to include training and debriefing time. We are assuming that 50% of observers will be experienced observers and 50% of the observers will be new. The average salary for an experienced observer is $3,200 not $2,900/mo. and they are employed for 3.33 months. Average salary for three levels of experienced observers is: Grade 2 = $3,000, Grade 3 = $3,200, and Grade 4 = $3,400. The average salary for a new observer is $2,450/mo. and they are employed for 3.9 months.

2/ Insurance assumes Alaska Worker's Comp. with maritime and USLH endorsements and group buying by contractors. Also assuming $1 million limits and CGL.

3/ Does not allow for observers quitting, getting sick, or other reasons for leaving prior to 90 days, nor does it include moving observers to multiple assignments/destinations within the 3 mo. contract. Add 10% for 100% boats and $100/mo. for 30% boats. Use of standard round trip air fare, for example Seattle to Dutch Harbor which is about $1,200.

4/ Assume 3 days x $135/day per 90 day trip. Use of standard government per diem rates for Dutch Harbor deployment which is the same as air fare was selected for.

5/ Does not allow for drug tests or increased requirements.

Table A4 Estimated NMFS Enforcement costs ($1,000's) for implementation and annual operation of North Pacific Fisheries Research Plan. These costs would **not** be covered through collection of fees under the Research Plan.

COST ELEMENTS	ESTIMATED COST (3 Agents)
LABOR, BENEFITS, COLA	$300.0
TRAVEL	-
TRANSPORTATION	-
RENTS/COMMUN./ UTILITIES	-
PRINTING	-
CONTRACTS	-
SUPPLIES/ EQUIPMENT	-
OTHER	-
TOTAL	$300.0

Table A5 Estimated cost for the ADF&G shellfish observer program (refer to Tables 6 and 7 for details on agency costs and average cost per observer month).

A. Estimated direct observer costs for vessels:

326 MO. X $7,414/Mo. = $2,416,964

B. Estimated ADF&G operational costs: $ 566,900

C. Total estimated cost for program: $2,983,864

Table A6 Estimated agency costs ($1,000's) for ADF&G shellfish observer program.

PROGRAM ELEMENTS

COST ELEMENTS	PROGRAM OPERATIONS	TRAINING[2/]	DEBRIEFING	DATA MNGT.	TOTAL
LABOR & BENEFITS	$ 67.1	$ 39.6	$ 133.1	$ 88.6	$328.4
TRAVEL	16.1	15.4	-	-	31.5
TRANSPORTATION	-	-	-	-	0.0
RENTS/COMMUN./ UTILITIES	53.2	-	-	-	53.2
PRINTING	6.8	-	-	-	6.8
CONTRACTS	-	11.2	-	-	11.2
SUPPLIES/ EQUIPMENT[1/]	133.2	2.6	-	-	135.8
OTHER	-	-	-	-	0.0
TOTAL	$ 276.4	$ 68.8	$ 133.1	$ 88.6	$566.9

1/ Includes cost for observer sampling and safety gear.

2/ Approximately $85,000 additional funds will be necessary if the University of Alaska Anchorage (UAA) continues to provide observer training for the shellfish program.

Table A7. Estimated average costs per observer month for ADF&G shellfish observers in Alaska based on comments by observer contractors.

Average Observer Costs - 3 Month Deployment

Cost Item	New Observers Cost/Month	Experienced Observers Cost/Month
Observer Salaries[1]	$3,370	$3,370
Benefits (12.5%)	421	421
Insurance (28%)[2]	945	945
Sub-Total cost	$4,736	$4,736
Travel		
Air fare[3]	$ 600	$ 440
Per diem[4]	540	200
Excess bag	0	0
Physical exam[5]	25	25
Contractor's services (25%)	1,475	1,350
Profit or Fee (5%)	368	338
Total	$7,744	$7,089

Average cost per observer month assuming a 50:50 ratio of new to experienced observers is about $7,414.

1/ Average observer salary per month is prorated to include training and debriefing time. We are assuming that 50% of observers will be experienced observers and 50% of the observers will be new. The average salary for an experienced observer is $3,200 not $2,900/mo. and they are employed for 3.33 months. Average salary for three levels of experienced observers is: Grade 2 = $3,000, Grade 3 = $3,200, and Grade 4 = $3,400. The average salary for a new observer is $2,450/mo. and they are employed for 3.9 months.

2/ Insurance assumes Alaska Worker's Comp. with maritime and USLH endorsements and group buying by contractors. Also assuming $1 million limits and CGL.

3/ Airfare for new observers does not include 30-day check-in requirement. Many are from Pribilof Islands to Dutch Harbor. Travel for experienced observers does not allow for observers quitting, getting sick, or other reasons for leaving prior to 90 days, nor does it include moving observers to multiple assignments/destinations within the 3 mo. contract.

4/ Does not include time between test and season opening for new observers, week between fisheries for red king crab and C. bairdi tanner crab, time for 30-day check-in for new observers. For new observers, assume 12 day per contract (4 days x $135/day=$540/mo.). For experienced observers assume 4.5 days per contract (1.5 days x $135/day=$200/mo.). Use of standard government per diem rates for Dutch Harbor deployment which is the same as air fare was selected for.

5/ Does not allow for drug tests or increased requirements.

Table A8 Estimated cost for different levels of observer coverage in the domestic groundfish observer program.1/

Level of Coverage (%)	Observer Effort2/ (months)	Estimated Cost3/ ($1,000's)
100%	1,486.5	$13,478.1
80%	1,189.2	$10,782.5
70%	1,040.5	$ 9,434.2
62%4/	924.0	$ 8,630.2
60%	891.9	$ 8,086.8
50%	743.2	$ 6,738.6
40%	594.6	$ 5,391.2
30%	445.9	$ 4,043.0
20%	297.3	$ 2,695.6
10%	148.6	$ 1,347.4

1/ Total effort and coverage are for vessels greater than 60 feet LOA or greater and processing plants or motherships which process 500 t or more per month of groundfish. Vessels under 60 feet LOA accounted for an additional 300 months of fishing effort.

2/ The level of observer effort (observer months) is based on the number of fishing days reported in vessel fishing logs from 1991. The number of reported fishing days were then corrected upwards to account for time which an observer is aboard a vessel or between trips that is not accounted for by the just the number of vessel fishing days.

3/ An average cost of $9,067/month was used to estimate the cost of observer coverage. This includes both the direct cost for observers (salary, benefits, travel, etc.) and the NMFS operational costs. Refer to Tables 2 and 3 for estimated costs for observers and NMFS operational budget.

4/ The current program observer coverage requirements should provide about 62% coverage of the fishing effort for vessels and plants which are above the minimum length or processing requirements.

APPENDIX II

Analyses of Observer Coverage Levels

in the NMFS Groundfish Observer Program

An evaluation of observer coverage levels in Alaska groundfish fisheries

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1. Introduction

This paper addresses several important issues that relate to the requirements for observer coverage in the Alaska groundfish fisheries. The focus here is on estimates of species composition for the entire fishery, and on the effect of changes in the level of observer coverage on the confidence intervals of these estimates. Species composition estimates include 1) the proportion by weight of the target species, 2) the proportion by weight of other allocated groundfish species, 3) the incidence rate of prohibited species, expressed in kilograms per ton of catch, or in numbers per ton of catch. A common method to estimate the total catch of a species is to multiply the total reported catch of all vessels participating in a fishery by these proportions (or incidence rates). This method assumes that the total reported catch is a valid estimate of the true catch. While it is difficult to document differences between the catch of vessels without observers and the catch of vessels with observers, some indications of the reliability of vessel reporting can be obtained by comparing the reported catch of vessels that carried observers to estimates of their catch based on hauls sampled by observers.

The approach used in the analysis to examine the issue of coverage levels was to begin with a data set of all the species composition and haul information from a collection of vessels with observers. The effects of different levels of observer coverage can then be assessed by selecting the subset of the complete data that came from a specified proportion of the vessels and estimating the species composition and its variance using the reduced set of data.

2. Survey Design

The observer program uses a multi-stage cluster design (Cochran 1977). In multi-stage cluster sampling, primary sampling units are subsampled to obtain subunits. A third level of sampling is achieved by sampling the subunits. The primary sampling units in this analysis are vessels, which can be sampled, i.e. an observer placed on board, or not. The individual hauls made by a vessel are subunits. The observer randomly selects hauls to sample; typically this ranges from 40 to 60 percent of the hauls made by a vessel. When whole haul sampling is used, all of the individuals of a species in the sampled haul are weighed and counted. When basket sampling is used, each basket is a subsample from the haul, making a third level of sampling. The species composition of these replicate subsamples is not recorded. Only the aggregate sample weights are recorded for each species.

To make inferences about the characteristics of the population (the total catch by the fishery) using estimators based on the survey design, it is essential that the sample units be selected randomly at each stage of sampling. These estimators will have a component of variability associated with each level of sampling. Three variance components can be identified: 1) the variability in the species composition between vessels, 2) the variability between hauls within a vessel, and 3) the variability between baskets within a haul. Because the species composition from the replicate baskets is not recorded, the third component of variability can not be estimated with the data currently available.

In the analysis that follows, species compositions for hauls that were basket sampled were scaled up to the total haul weight using the ratio of haul weight to total basket sample weight. It was assumed that this expansion had no variability associated with it. The result of ignoring this component of variability is that the variance estimates and confidence intervals for species composition are lower bounds for the true variance. For species that were whole haul sampled most of the time, for example, halibut and salmon, the true variance would not be much larger than the conditional variances reported in the results.

A further consideration that relates to variance estimation is that the population of sampling units is finite at each level of sampling. A finite number of vessel participate in the fishery; each vessel makes a finite number of hauls; and a finite number of basket samples can be taken from a haul. As the proportion of the vessels with observers increases, the component of variance due to differences between vessel would decrease--even more than it would if the population were of unlimited size. At 100% observer coverage, the component of variance due to between vessel differences would vanish. Similarly, the variance components due to between haul variability and between basket variability would decrease with increases in number of hauls sampled or the number of baskets taken from a haul respectively.

3. Data sets

To limit the scope of the analysis, it was decided to concentrate on estimates of the weekly species composition of the catch of several fisheries. The two fisheries selected were 1) the Bering Sea pollock mid-water trawl fishery and 2) the Bering Sea cod bottom trawl fishery, both occurring in statistical areas 513, 517, 521, and 522. For any given week in 1991, there were too few vessels in the observer data base to give an adequate sample size to examine the effect of changes in the level of observer coverage. Consequently, weekly blocks of data for the weeks 22-26 of 1991 were combined for the mid-water pollock fishery (113 vessel-weeks = primary sampling units, 1084 sampled tows = secondary sampling units). The total reported groundfish catch for these vessels was 80,248.60 mt. For the bottom trawl cod fishery, weekly blocks of data for weeks 0-18 in 1991 were used (105 vessel-weeks, 766 sampled tows) The total reported groundfish catch for these vessels was 18,882.04 mt. The only additional criteria used for selecting a block of data was that there had to be at least two hauls sampled by the observer during the week. This criteria was imposed because a minimum of two hauls was needed to estimate the between haul variance.

4. Procedures

Estimates of species composition or incidence rates are in the form of a ratio, the catch (in numbers or weight) of a species divided by the catch of all species. A common procedure used in surveys is to separately estimate the population total for the numerator and the denominator of the ratio, then calculate the ratio by dividing the estimate the population total of the numerator by the estimate of the population total of the denominator. Estimators of this type are biased, but the bias is likely to be small with large sample sizes. This method was used to estimate the species composition of the catch.

To estimate the population totals for the numerator and the denominator, the linear unbiased estimator for a two-stage cluster survey design was used (Cochran 1978, p303). The primary cluster units are vessel-weeks, i = 1,...,N. Observers are placed on n of these vessels, so that the first stage sampling fraction is $f_1 = n/N$. Within each vessel-week, M_i hauls are made by the vessel, of which m_i are sampled. The sampling fraction at the second stage of sampling is $f_{2i} = m_i/M_i$. The catch of a species in tow j, j = 1,...,m_i, by vessel i is y_{ij}. Separate subscripts for each species are not defined here, since the estimator has the same form for each species. The unbiased estimator of the total catch of a species, Y, is

$$\hat{Y} = \frac{N}{n}\sum_{i=1}^{n}\frac{M_i}{m_i}\sum_{j=1}^{m_i} y_{ij}$$

The total catch of all species, X, was estimated using the same unbiased estimator, except that x_{ij}, haul weight of haul j by vessel i, replaces y_{ij}. The ratio estimate of species composition is

$$\hat{R} = \frac{\hat{Y}}{\hat{X}}$$

This estimator is similar to the estimator used routinely by the observer program to estimate species composition. It uses ratio of the total number of vessels to the number of vessels with observers to expand the sampled vessel totals to the entire fleet at the first stage of sampling, and uses the ratio of total tows to sampled tows as the expansion factor for the second stage of sampling. The observer program estimator uses the ratio of reported catches at both levels of sampling. The ratio estimates of species composition should be similar for both methods. An advantage of the estimator used here is that it can provide an independent estimate of total catch of the fleet using only the haul weights of tows sampled by observers.

Since ratio estimators are nonlinear, standard methods for estimating their variance rely on a linear approximation techniques. The bootstrap method (Efron and Gong 1983) is an alternative approach that has become a favored method in recent years for estimating variances and confidence intervals for nonlinear estimators. The bootstrap method is a simple non-analytic approach that relies on iterative computer simulation of the sampling process. The method for bootstrapping a two stage cluster design used in this analysis is given by Rao and Wu (1988, Section 6).

A two-stage resampling procedure was used to obtain a bootstrap estimates from the data. First, n vessels-weeks were selected with replacement from the sample of n vessel-weeks at the specified level of observer coverage. For each vessel selected, a random sample of m_i hauls were selected with replacement from the m_i hauls sampled during that week by vessel i. If a vessel-week was chosen more than once at the first stage, the second stage of sampling was done independently. The bootstrap estimate of the species composition is calculated from the data from these bootstrap samples. The bootstrap estimator is not the same as the estimator above because it must provide the correct scaling due to finite population sampling. Details are given by Rao and Wu (1988). For each level of observer coverage, 1,000 bootstrap iterations were performed on the sample. The variance of the bootstrap estimates is an estimate of the variance of the species composition estimator. The percentile method was used to estimate the 90%, 70%, 50% confidence intervals (Efron and Gong 1983). Since the estimates were very close to the bootstrap mean, no bias correction was considered necessary.

5. Results

Table 1 gives the estimates of species composition and 90% confidence interval estimates for five species in the pollock mid-water trawl fishery. The species are pollock, Pacific cod, rock sole, salmon (all species), halibut. For pollock, cod, and rock sole, the measure of species composition is the proportion by weight in the catch. The incidence of halibut is measured in kg per ton of groundfish, while the incidence of salmon is measured in numbers of fish per ton of groundfish. The estimates are given for levels of observer coverage ranging from 10 to 100 percent.

Figures 1-5 show the percent error of the 90, 70, and 50 percent confidence intervals for these species composition estimates as a function of observer coverage. The percent error for a confidence interval was calculated as follows:

upper percent error = [(*upper bound* / *estimate*) - 1)] × 100,

lower percent error = [(*lower bound* / *estimate*) - 1] × 100.

The percent error of the 90% confidence interval are shown in the figures by the square symbols. Smoothed curves are shown for the bounds of the 90, 70, and 50 percent confidence intervals as a function of percent observer coverage. The smoothed curves were obtained using the super smoother algorithm (Friedman 1984).

Table 2 gives the results for the bottom trawl cod fishery. Table 2 follows the same format as Table 1. Estimates of species composition, and 90% percent confidence interval are given for Pacific cod (proportion by weight), pollock (proportion by weight), Pacific Ocean perch (proportion by weight), halibut (kg per ton), and tanner crab (numbers per ton). Although the catch of king crab is also of interest in this fishery, the extremely patchy distribution of this species in the catch made it difficult to obtain variance estimates. At low levels of observer coverage, it was possible that no king crab would be observed, giving zero bycatch with no variance estimate. Figures 6-10 show the percent error of the 90, 70, and 50 percent confidence intervals for these species composition estimates as a function of observer coverage. Figures 6-10 follow the same format as Figures 1-5.

A final set of figures, (Figs. 11-14) examines the effect of changing levels of observer coverage on estimates of the total catch, $\hat{X}$. The total catch estimate occurs in the denominator of the ratio estimator, but is important in its own right because it provides an independent estimate of the total catch. Figures 11 and 12 show the estimate of the total catch and 90% confidence interval at different levels of observer coverage for the pollock and the cod fishery respectively. In both cases the independent estimate tends to be greater than the reported catch, though not significantly different at 0.10 level until about 50 percent observer coverage is reached for the cod fishery, and about 75 percent observer coverage is reached for the pollock fishery. One factor contributing to the width of the confidence intervals for the estimates of total catch is variability in the catch during a vessel-week blocks because of vessels that did not fish for the entire week or because observer were not on the vessel for the entire week. An estimator that took into account the percent of days on grounds with an observer on board during the week would improve the estimates of total catch shown here. Figures 13 and 14 show the percent error of the 90, 70, and 50% confidence intervals for the total catch estimate, and follow the same format as Figures 1-5.

6. References

Cochran, W. G. 1978. Sampling techniques. John Wiley and Sons, New York, 428 p.

Efron, B. and G. Gong. 1983. A leisurely look at the bootstrap, the jackknife, and cross validation. Amer. Stat. 37:36-48.

Friedman, J. H. 1984. A variable span smoother. Tech. Rep. No. 5, Laboratory for computational statistics, Dept. of Statistics, Stanford Univ., California.

Rao, J. N. K., and C. F. J. Wu. 1988. Resampling inference with complex survey data. J. Amer. Stat. Soc. 83:231-241.

Table 1. Species composition and bootstrap estimates of 90 percent confidence intervals for the pollock mid-water trawl fishery for different levels of observer coverage. The coefficient of variation is the standard deviation divided by estimate. The percent error of the 90% confidence interval is calculated by 1/2(90% *upper b.* - 90% *lower b.*)/(*est.prop.*).

A. Pollock (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.9829	0.9829	0.0059	0.9730	0.9921	1.0
20	0.9855	0.9856	0.0022	0.9819	0.9891	0.4
30	0.9818	0.9819	0.0024	0.9777	0.9857	0.4
40	0.9822	0.9821	0.0020	0.9789	0.9854	0.3
50	0.9873	0.9873	0.0012	0.9854	0.9891	0.2
60	0.9873	0.9873	0.0011	0.9854	0.9891	0.2
70	0.9880	0.9881	0.0009	0.9866	0.9894	0.1
80	0.9877	0.9877	0.0008	0.9864	0.9889	0.1
90	0.9864	0.9864	0.0007	0.9853	0.9875	0.1
100	0.9867	0.9866	0.0004	0.9859	0.9874	0.1

B. Pacific Cod (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.0081	0.0081	0.3892	0.0038	0.0139	62.0
20	0.0086	0.0085	0.1397	0.0066	0.0106	23.4
30	0.0096	0.0096	0.1739	0.0072	0.0126	28.1
40	0.0102	0.0102	0.1318	0.0080	0.0125	21.9
50	0.0065	0.0065	0.0875	0.0055	0.0074	14.4
60	0.0073	0.0073	0.1051	0.0062	0.0087	17.4
70	0.0066	0.0066	0.0776	0.0058	0.0075	12.6
80	0.0069	0.0069	0.0725	0.0062	0.0078	12.3
90	0.0071	0.0071	0.0556	0.0065	0.0078	9.1
100	0.0073	0.0073	0.0396	0.0068	0.0078	6.8

C. Rock sole (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	Upper	Pcnt. err.
10	0.0008	0.0008	0.3198	0.0003	0.0012	52.7
20	0.0003	0.0003	0.5489	0.0001	0.0005	85.0
30	0.0007	0.0007	0.3702	0.0003	0.0012	61.6
40	0.0005	0.0005	0.3234	0.0003	0.0008	51.9
50	0.0005	0.0005	0.2375	0.0003	0.0007	39.2
60	0.0005	0.0005	0.2224	0.0003	0.0007	37.5
70	0.0003	0.0003	0.1795	0.0002	0.0004	28.9
80	0.0004	0.0004	0.1418	0.0003	0.0005	23.2
90	0.0004	0.0004	0.1122	0.0004	0.0005	18.2
100	0.0004	0.0004	0.0711	0.0004	0.0005	11.6

D. Salmon (all species) (numbers per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	Upper	Pcnt. err.
10	0.0038	0.0040	0.6920	0.0004	0.0089	113.0
20	0.0006	0.0007	0.4911	0.0002	0.0013	79.4
30	0.0009	0.0009	0.3514	0.0004	0.0015	58.9
40	0.0027	0.0027	0.3321	0.0013	0.0042	54.0
50	0.0015	0.0015	0.3670	0.0008	0.0026	61.3
60	0.0026	0.0026	0.2899	0.0016	0.0040	45.2
70	0.0028	0.0027	0.2189	0.0019	0.0038	34.3
80	0.0018	0.0018	0.1989	0.0013	0.0025	32.5
90	0.0024	0.0024	0.1969	0.0017	0.0033	32.4
100	0.0021	0.0021	0.1737	0.0015	0.0027	29.2

E. Halibut (kg per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.8185	0.8214	0.6765	0.1353	1.9267	109.4
20	0.1427	0.1405	0.4969	0.0413	0.2678	79.4
30	0.1732	0.1715	0.3134	0.0904	0.2690	51.6
40	0.2216	0.2315	0.6153	0.0818	0.4949	93.2
50	0.0753	0.0767	0.3461	0.0437	0.1213	51.5
60	0.0650	0.0649	0.2125	0.0459	0.0897	33.8
70	0.1273	0.1309	0.4916	0.0742	0.2490	68.7
80	0.1376	0.1392	0.3450	0.0905	0.2357	52.8
90	0.1507	0.1522	0.3041	0.1026	0.2434	46.7
100	0.1396	0.1397	0.2459	0.0897	0.2057	41.5

Table 2. Species composition and bootstrap estimates of 90 percent confidence intervals for the Bering Sea Pacific cod bottom trawl fishery for different levels of observer coverage. The coefficient of variation is the standard deviation divided by estimate. The percent error of the 90% confidence interval is calculated by 1/2(90% *upper b.* - 90% *lower b.*)/(*est.prop.*).

A. Pacific Cod (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.6575	0.6628	0.0673	0.5946	0.7387	11.0
20	0.7019	0.7025	0.0546	0.6393	0.7649	8.9
30	0.6996	0.6989	0.0506	0.6398	0.7591	8.5
40	0.7147	0.7124	0.0390	0.6683	0.7587	6.3
50	0.7105	0.7102	0.0301	0.6763	0.7482	5.1
60	0.7334	0.7329	0.0272	0.7001	0.7653	4.4
70	0.6971	0.6964	0.0244	0.6684	0.7253	4.1
80	0.6902	0.6900	0.0204	0.6669	0.7125	3.3
90	0.6943	0.6941	0.0176	0.6737	0.7143	2.9
100	0.7032	0.7034	0.0135	0.6874	0.7184	2.2

B. Pollock (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.1563	0.1550	0.1491	0.1159	0.1935	24.8
20	0.1443	0.1442	0.1777	0.1025	0.1863	29.0
30	0.1579	0.1583	0.1676	0.1166	0.2031	27.4
40	0.1611	0.1625	0.1299	0.1298	0.1974	21.0
50	0.1741	0.1741	0.0919	0.1484	0.2006	15.0
60	0.1501	0.1501	0.0960	0.1269	0.1737	15.6
70	0.1936	0.1939	0.0841	0.1692	0.2236	14.1
80	0.1900	0.1904	0.0701	0.1699	0.2144	11.7
90	0.1797	0.1799	0.0631	0.1629	0.1999	10.3
100	0.1779	0.1776	0.0509	0.1629	0.1931	8.5

C. Pacific Ocean Perch (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.0220	0.0212	0.5208	0.0021	0.0402	86.8
20	0.0101	0.0096	0.4892	0.0022	0.0185	80.3
30	0.0055	0.0054	0.5695	0.0014	0.0118	95.1
40	0.0037	0.0038	0.5678	0.0014	0.0080	90.9
50	0.0052	0.0052	0.3102	0.0029	0.0081	49.8
60	0.0051	0.0051	0.4199	0.0028	0.0093	64.4
70	0.0054	0.0054	0.3286	0.0031	0.0086	51.0
80	0.0059	0.0058	0.2025	0.0041	0.0080	33.1
90	0.0074	0.0075	0.2303	0.0052	0.0106	36.9
100	0.0065	0.0066	0.2029	0.0045	0.0090	34.2

D. Pacific halibut (kg per ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	22.4069	21.7004	0.4701	8.5488	40.8028	72.0
20	21.1227	21.5851	0.2237	14.7745	30.0974	36.3
30	14.9864	15.0994	0.1454	11.6099	18.7949	24.0
40	20.0039	20.2318	0.1758	14.8356	26.2958	28.6
50	13.1769	13.3039	0.1745	9.7961	17.1851	28.0
60	13.3972	13.5244	0.1316	10.8635	16.5459	21.2
70	13.8979	13.8347	0.1173	11.3861	16.7361	19.2
80	13.5859	13.6356	0.0901	11.7685	15.7454	14.6
90	13.8367	13.8161	0.0815	12.1064	15.8247	13.4
100	13.7564	13.7489	0.0578	12.4307	15.0735	9.6

E. Tanner crab (all species) (numbers per ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	1.8729	1.9404	0.6012	0.1690	3.9245	100.3
20	2.6637	2.7129	0.2477	1.7145	3.8888	40.8
30	6.1039	6.1275	0.3115	3.2837	9.5709	51.5
40	5.2442	5.2114	0.2479	3.2818	7.5372	40.6
50	3.0870	3.0891	0.2134	2.1798	4.3967	35.9
60	3.5497	3.5785	0.1784	2.7023	4.7732	29.2
70	3.4839	3.4838	0.1463	2.7454	4.3728	23.4
80	3.7482	3.7657	0.1334	3.0669	4.7094	21.9
90	3.7560	3.7291	0.1034	3.1769	4.4202	16.6
100	3.4330	3.4483	0.0842	3.0186	3.9778	14.0

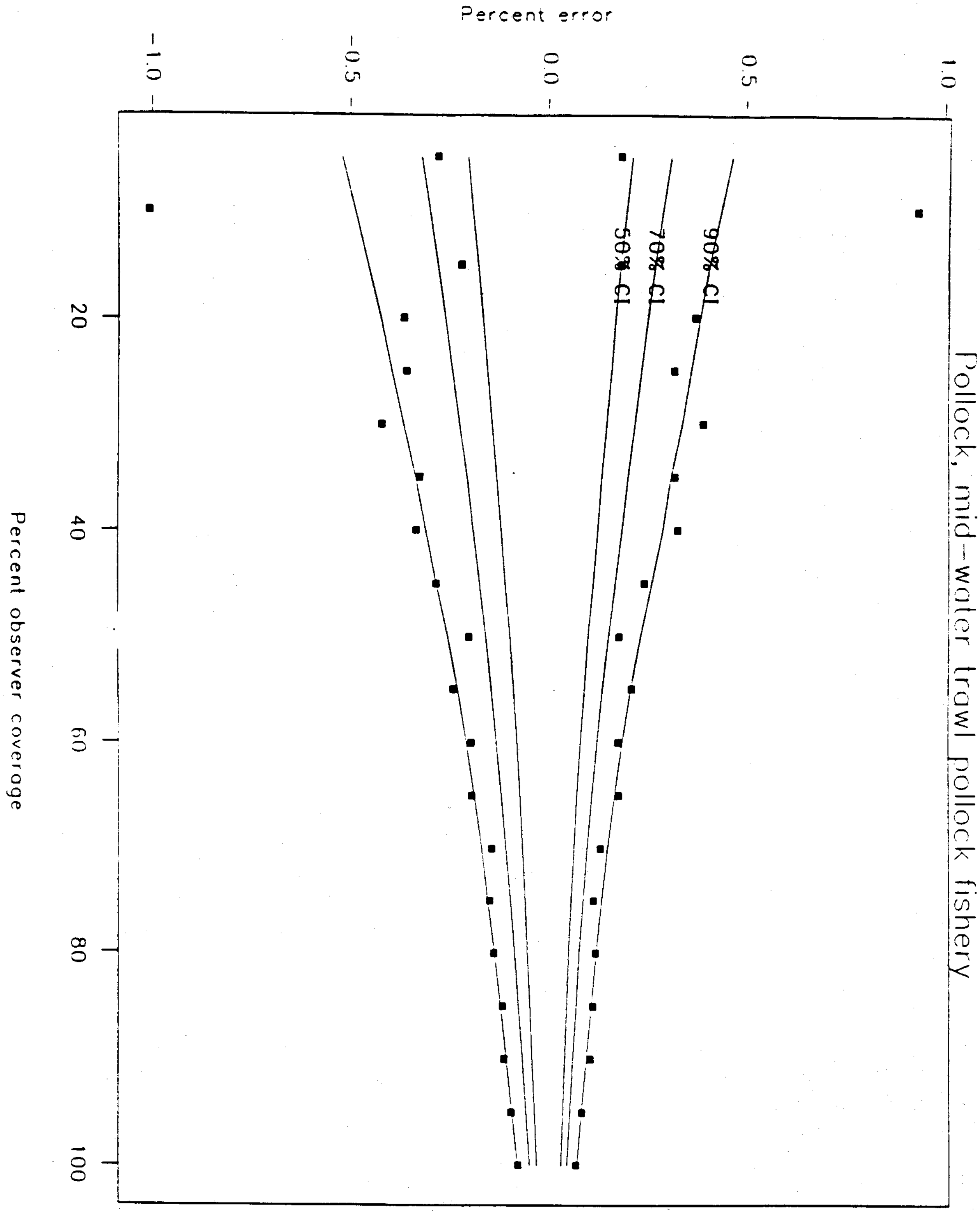

Pollock, mid-water trawl pollock fishery
Percent error
1.0
0.5
0.0
-0.5
-1.0
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

Fig. 1

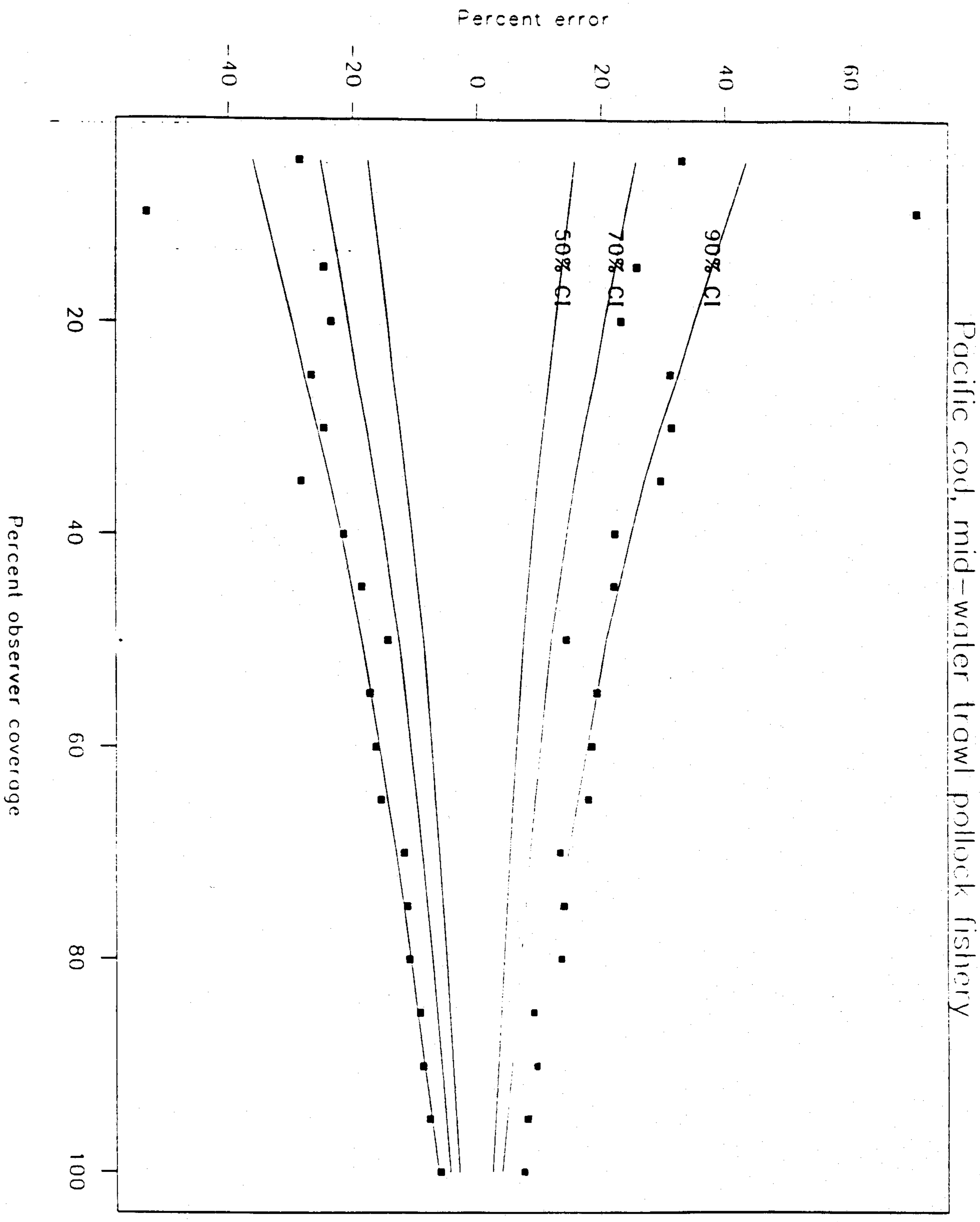

Pacific cod, mid-water trawl pollock fishery
Percent error
60
40
20
0
-20
-40
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

Fig 2.

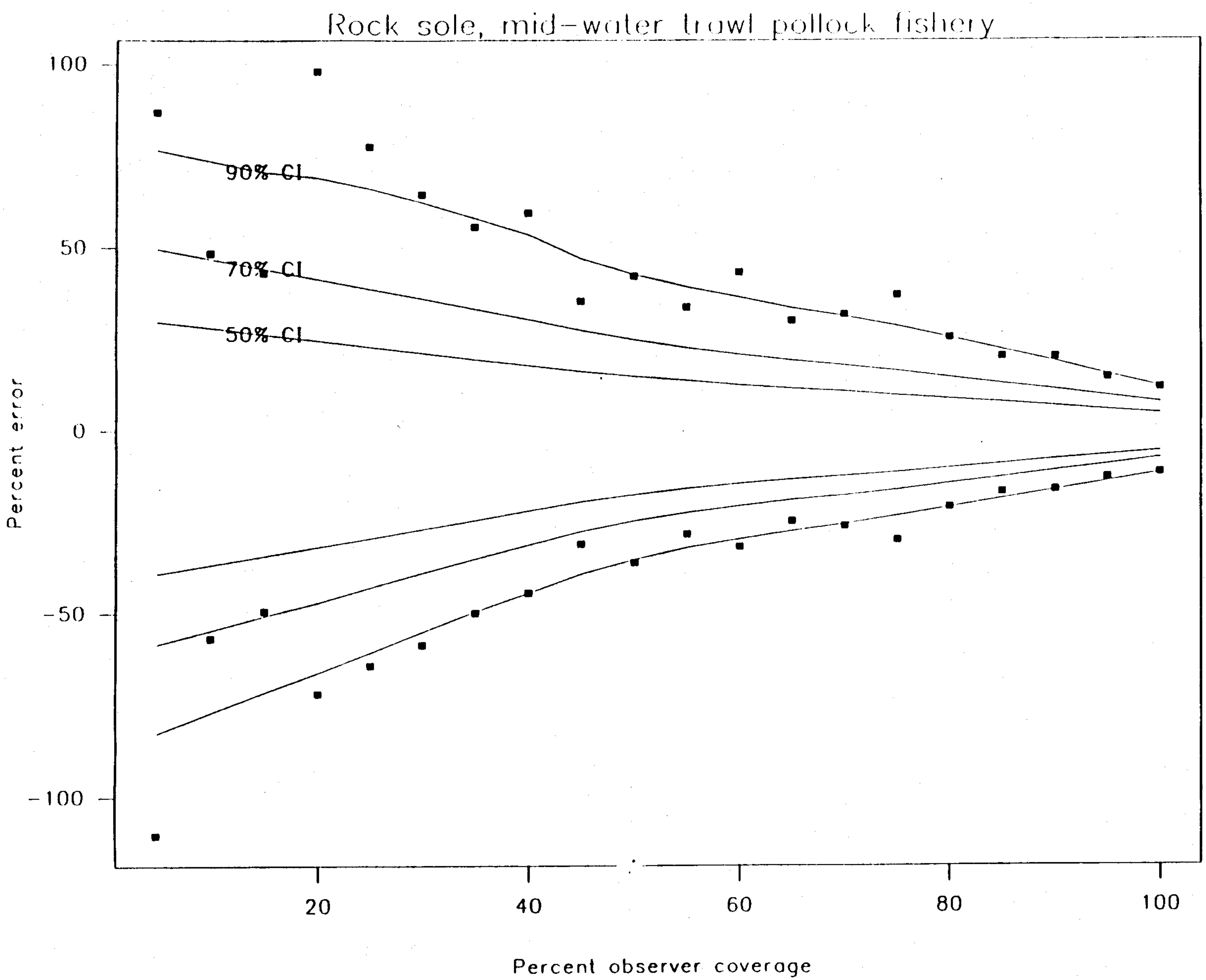

Rock sole, mid-water trawl pollock fishery
100
50
0
-50
-100
Percent error
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

Fig 3

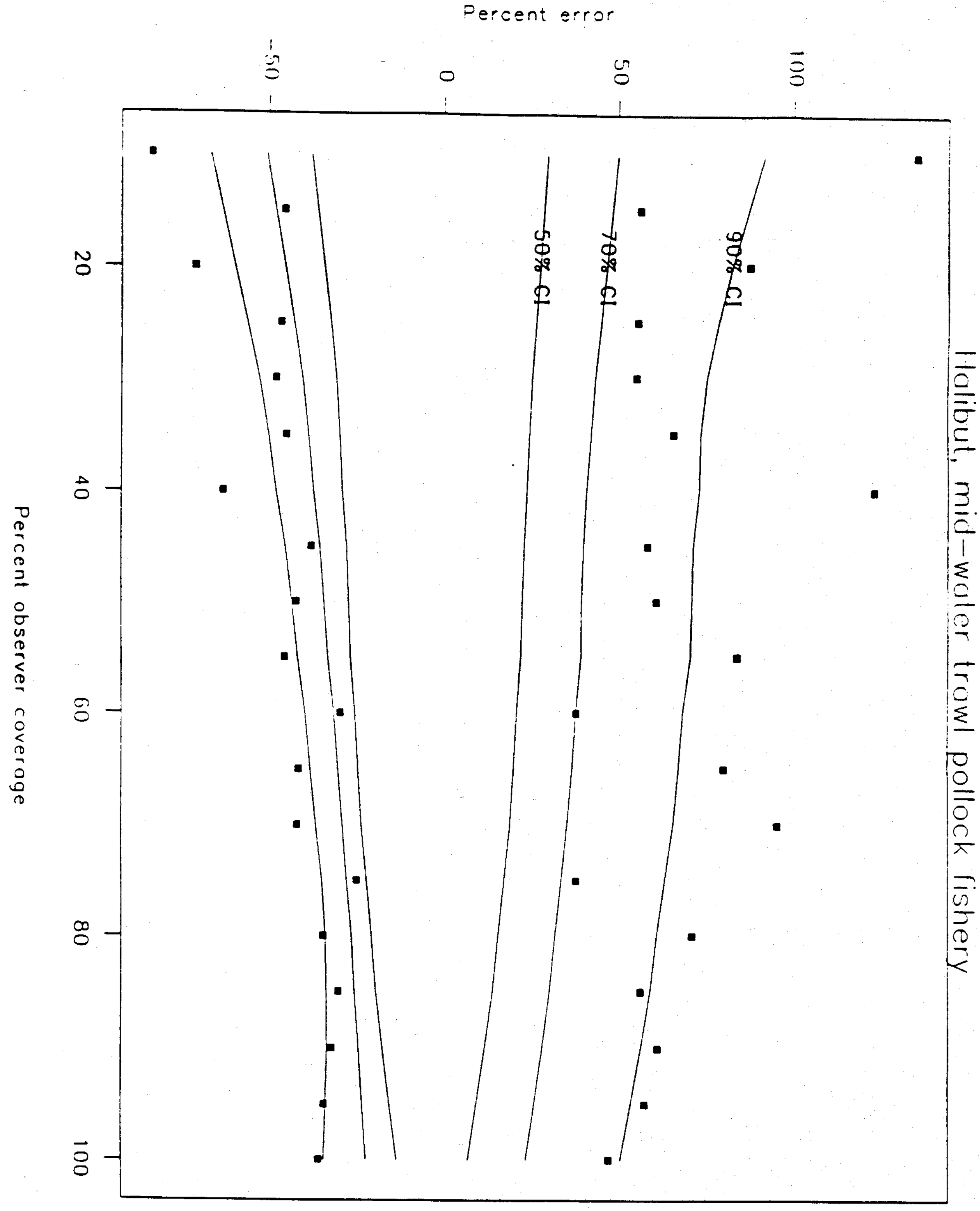
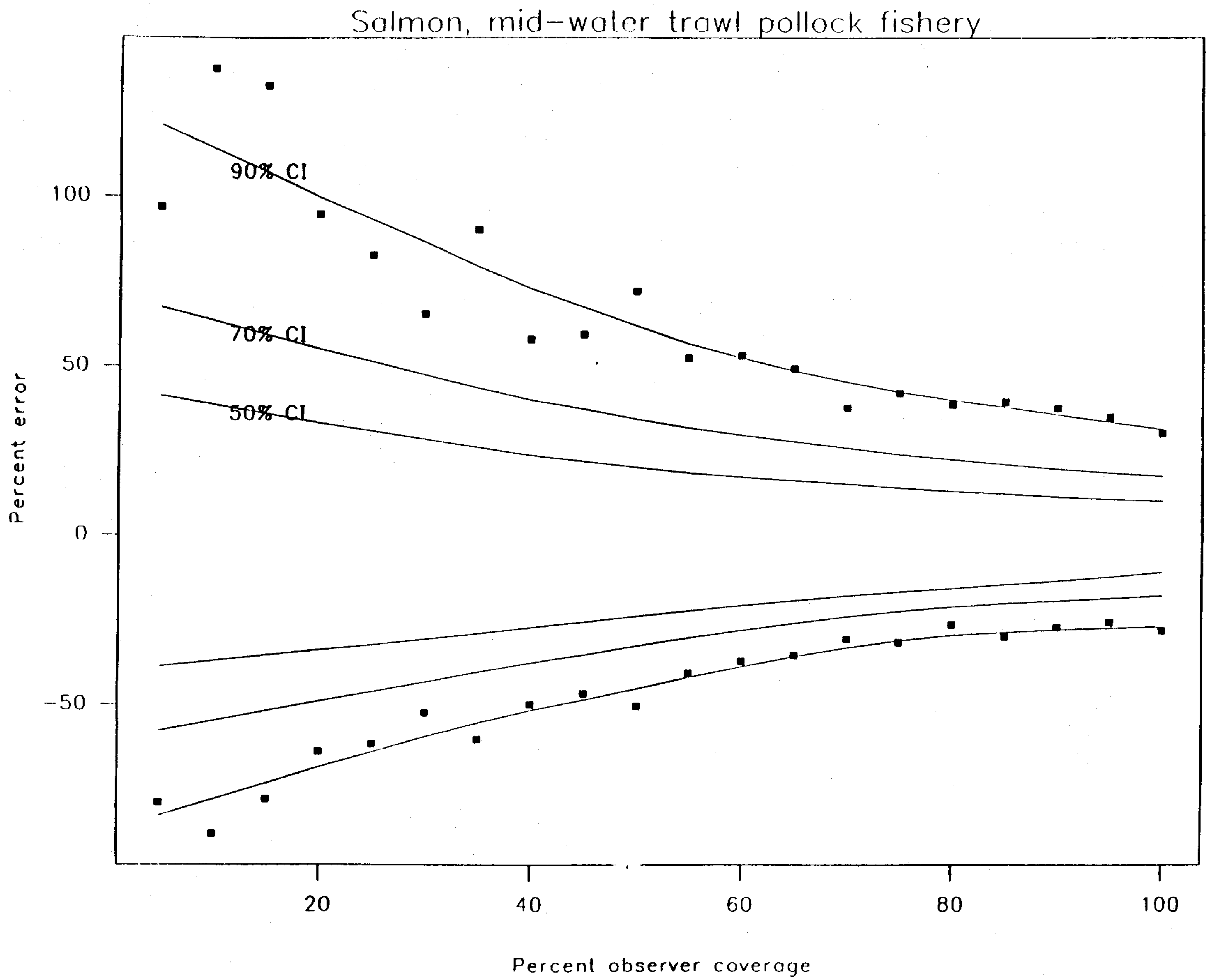

Halibut, mid-water trawl pollock fishery
Percent error
100
50
0
-50
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

Fig 4



Salmon, mid-water trawl pollock fishery
Percent error
100
50
0
-50
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

Fig 5

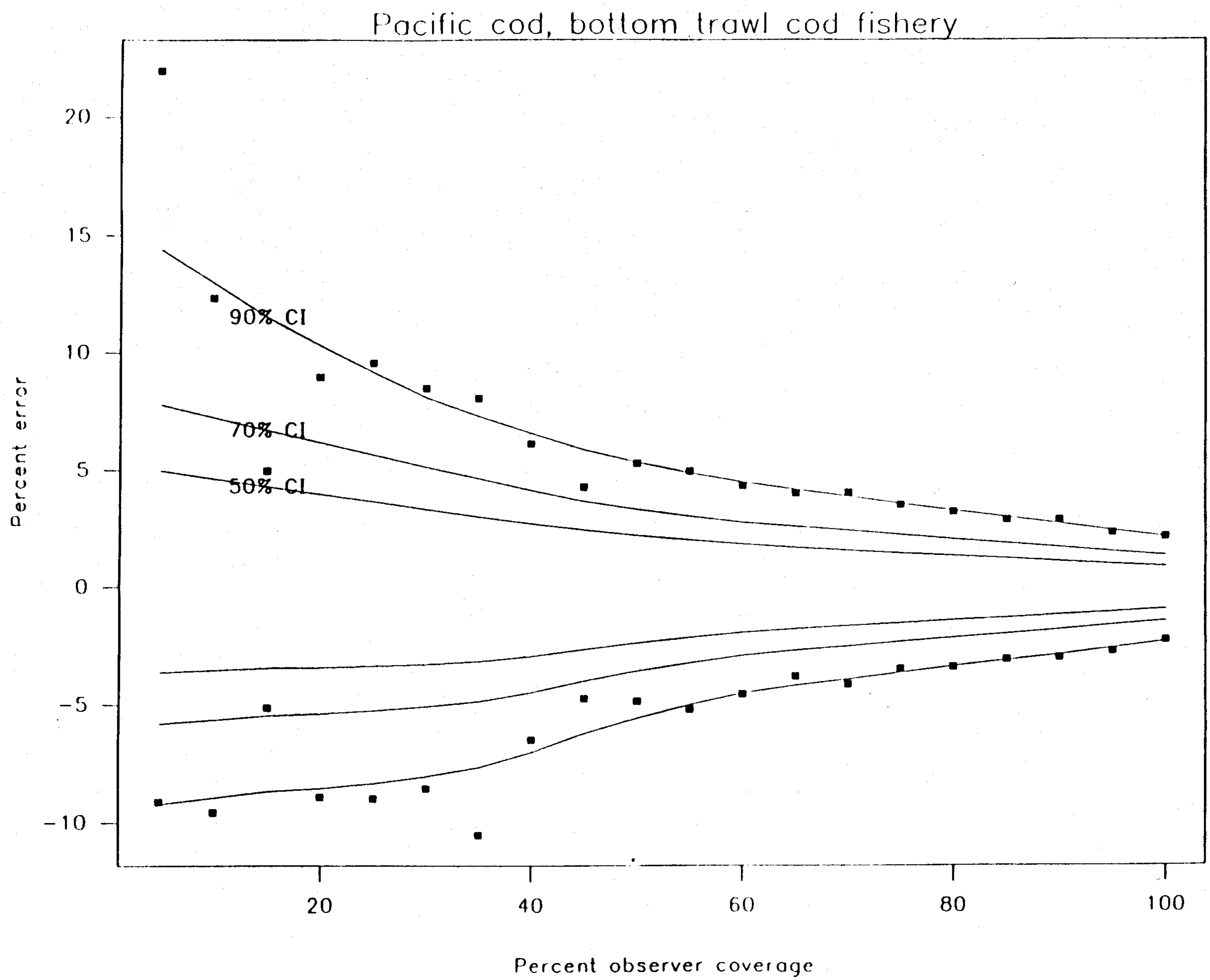

Pacific cod, bottom trawl cod fishery
Percent error
20
15
10
5
0
-5
-10
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

Fig 6

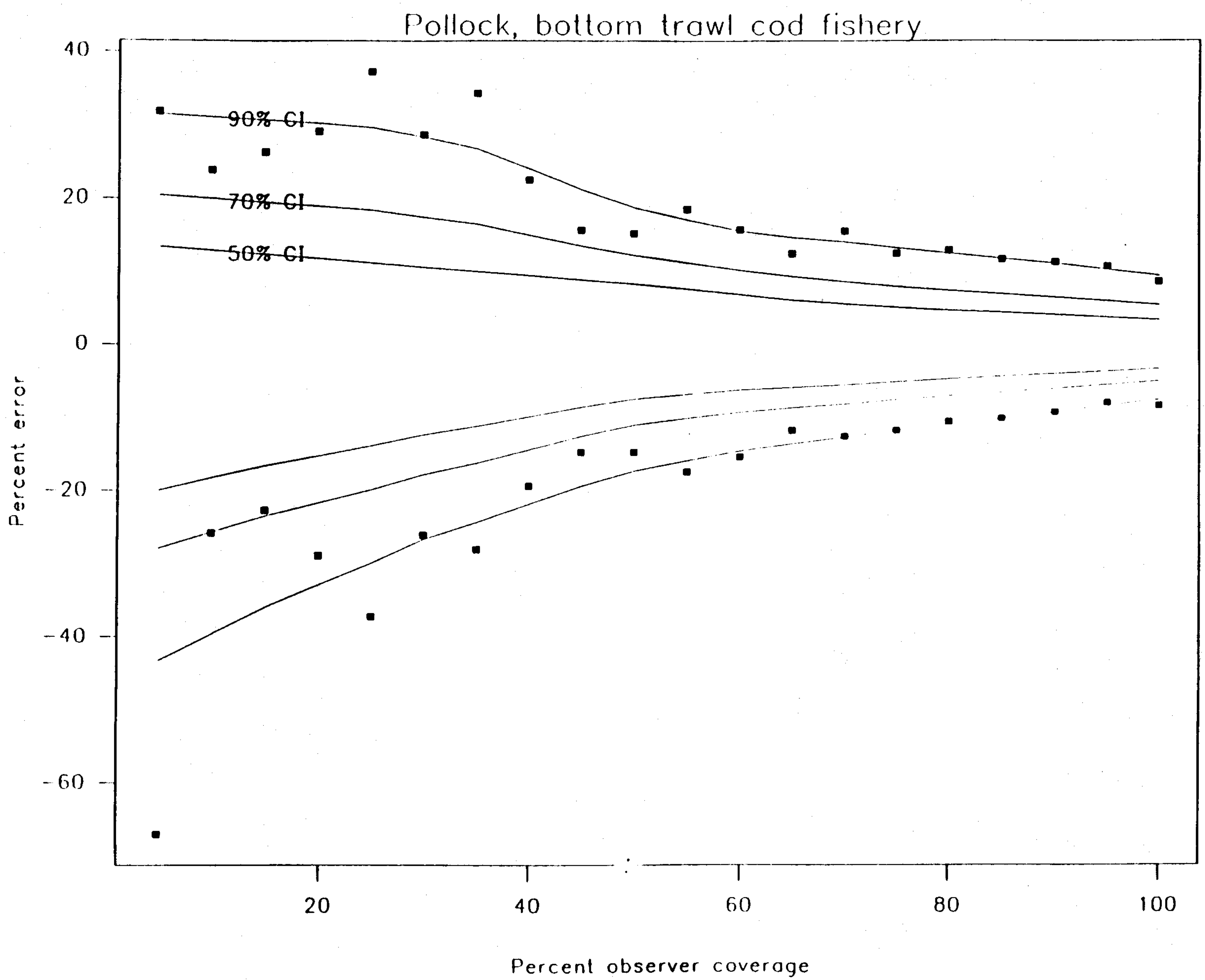

Pollock, bottom trawl cod fishery
90% CI
70% CI
50% CI
40
20
0
-20
-40
-60
Percent error
20
40
60
80
100
Percent observer coverage

Fig 7

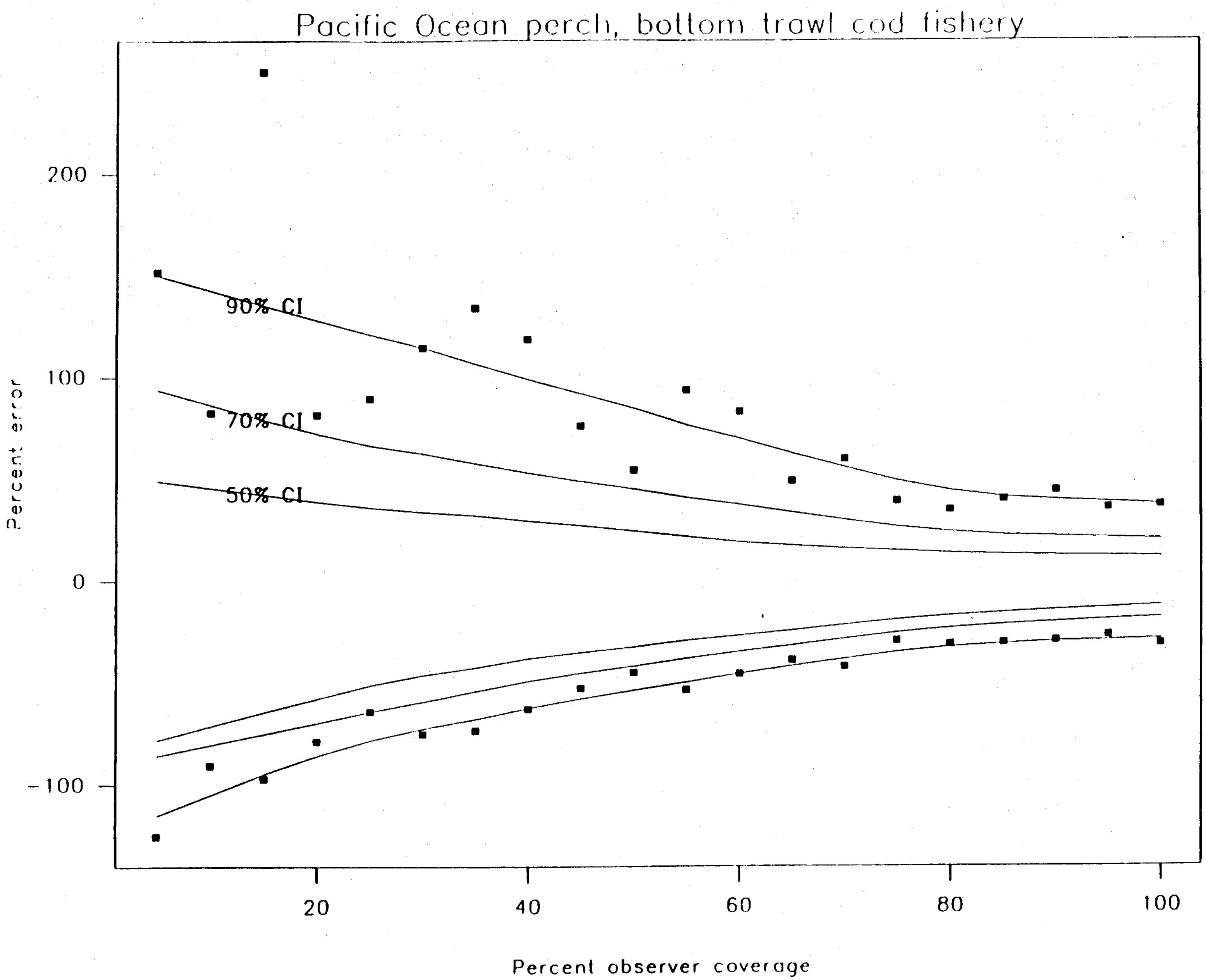

Pacific Ocean perch, bottom trawl cod fishery
90% CI
70% CI
50% CI
200
100
0
-100
Percent error
20
40
60
80
100
Percent observer coverage

Fig 8

Pacific halibut, bottom trawl cod fishery

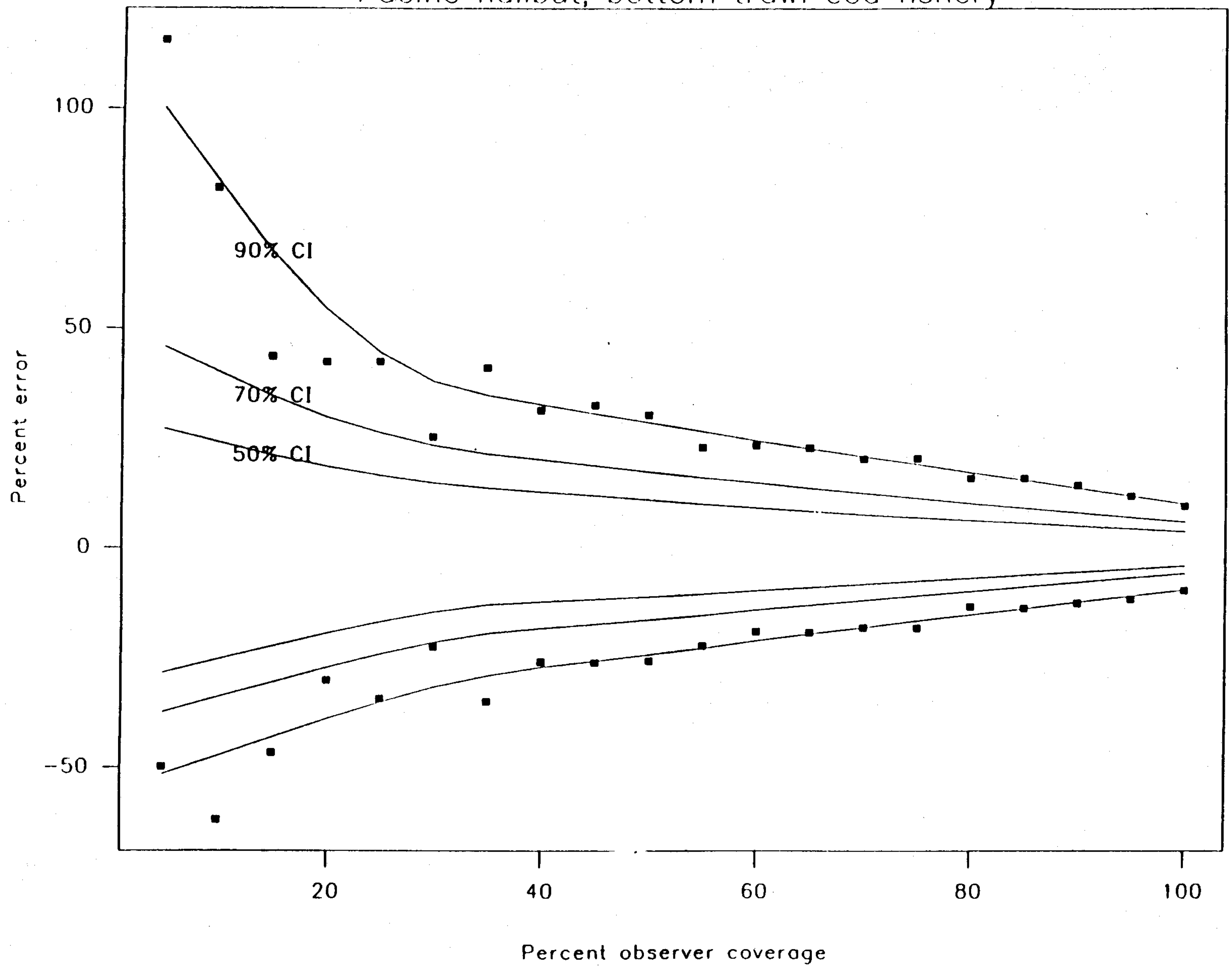


Fig 9

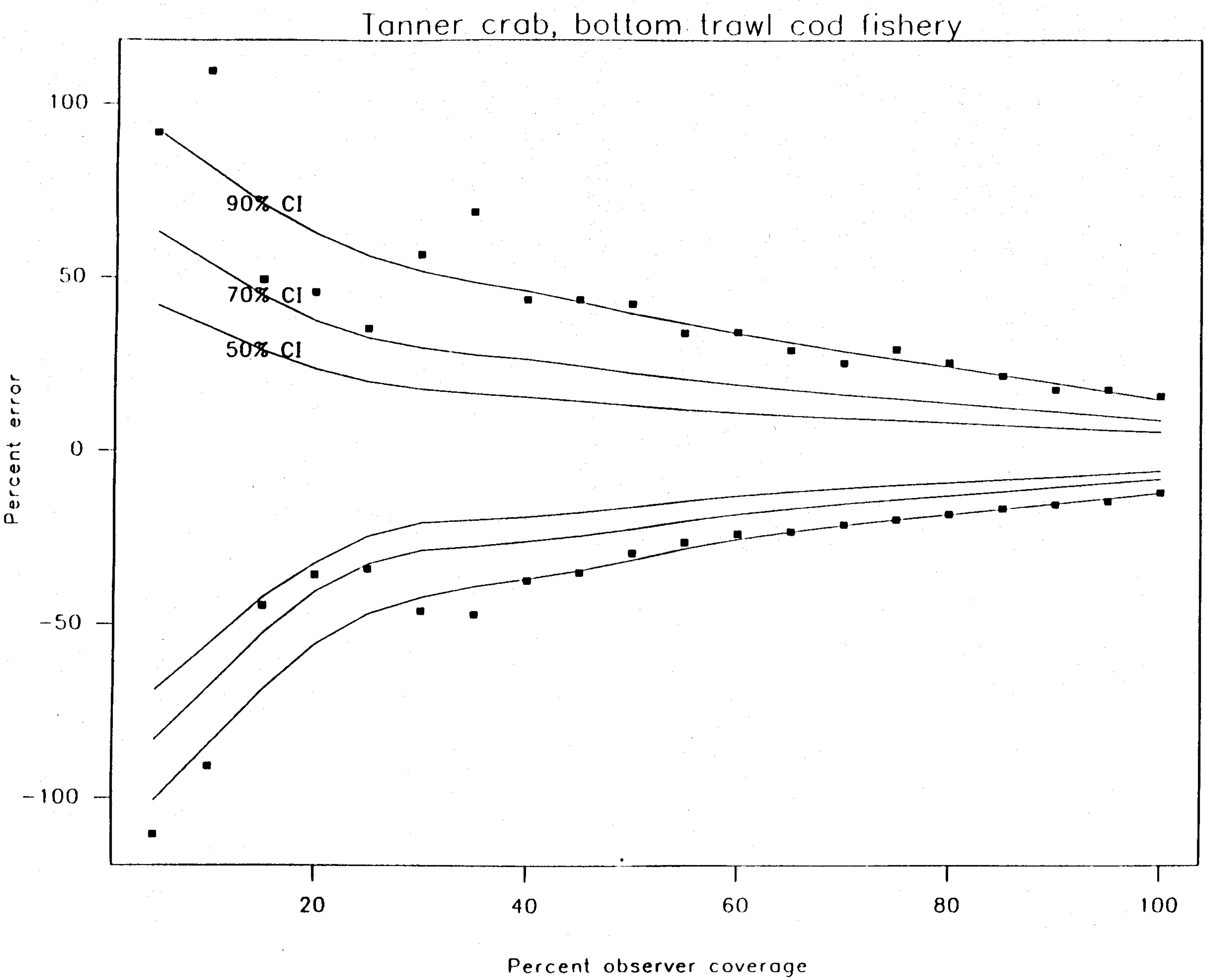

Tanner crab, bottom trawl cod fishery
Percent error
100
50
0
-50
-100
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

Fig 10

Total weight, mid-water trawl pollock fishery

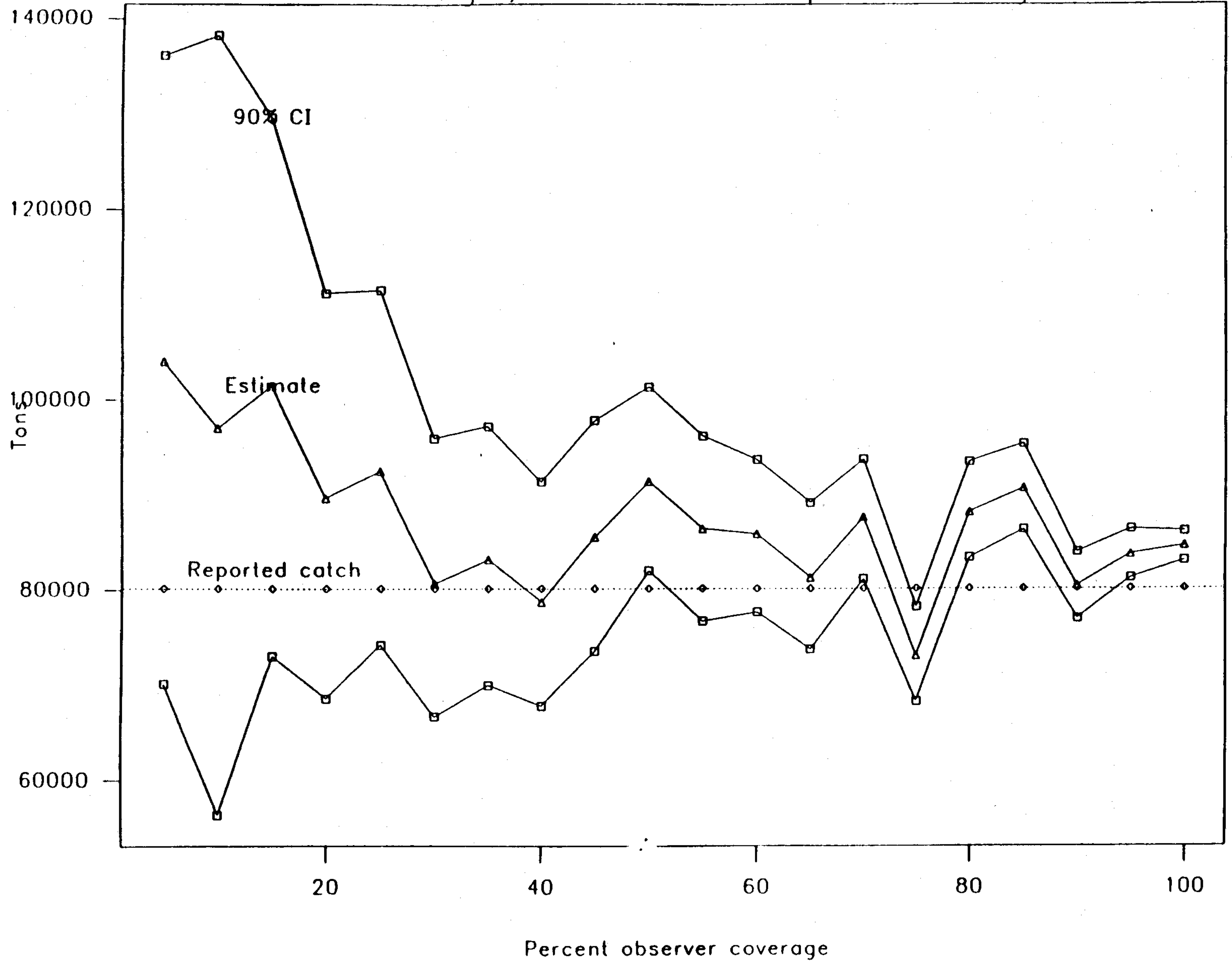


Fig 11

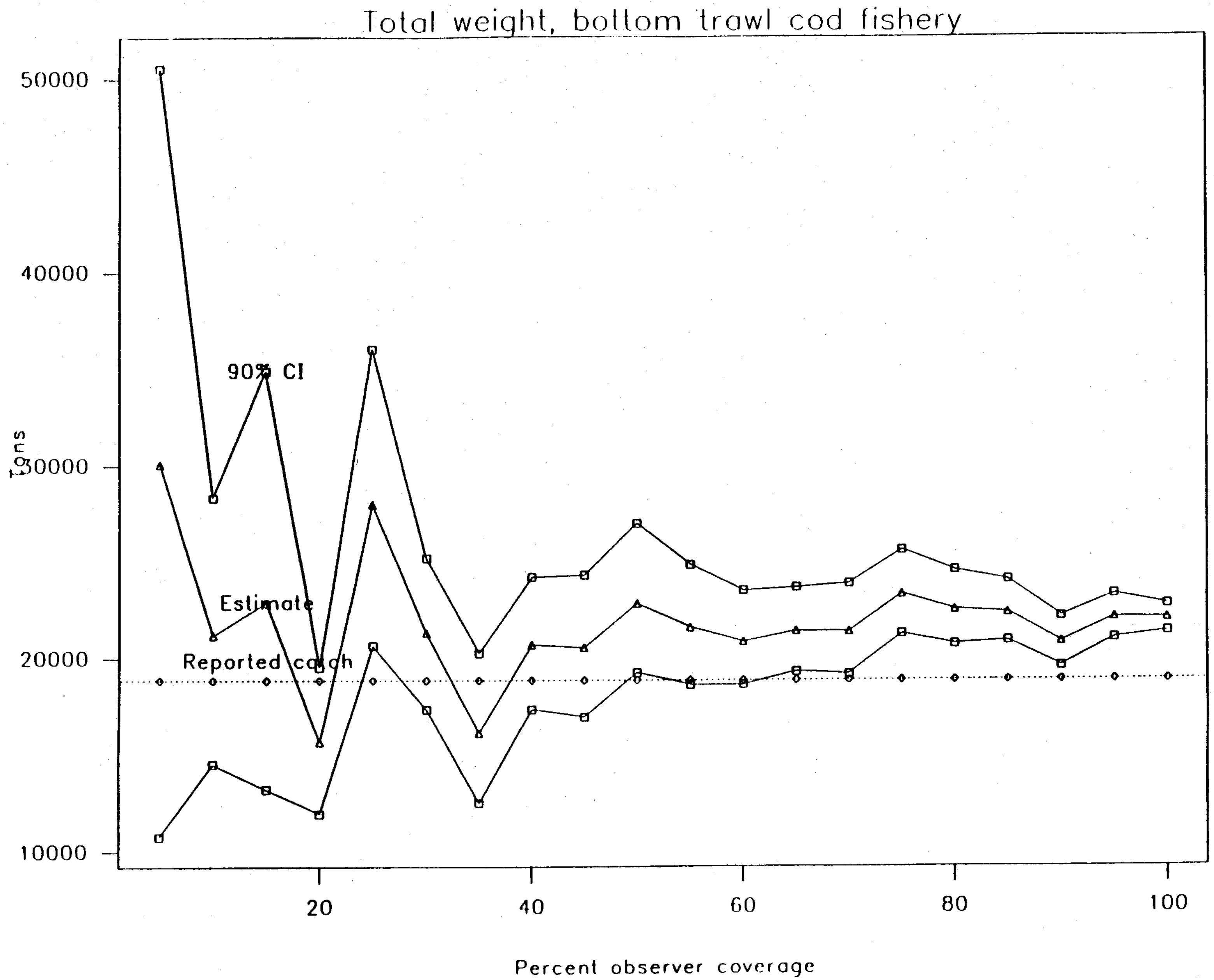

Total weight, bottom trawl cod fishery
90% CI
Estimate
Reported catch
Tons
50000
40000
30000
20000
10000
20
40
60
80
100
Percent observer coverage

Fig 12

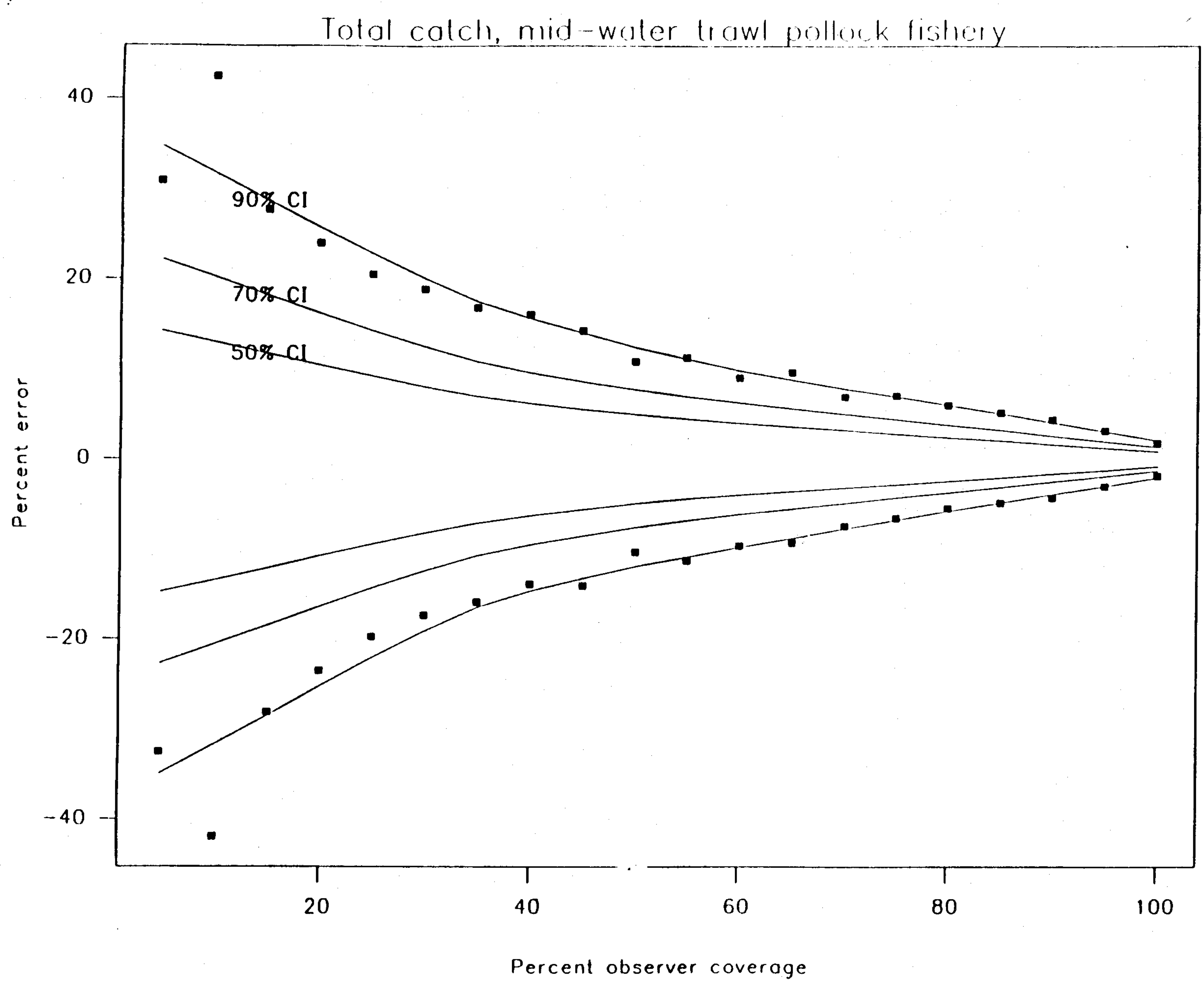

Total catch, mid-water trawl pollock fishery
Percent error
40
20
0
-20
-40
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

Fig 13

Total catch, bottom trawl cod fishery

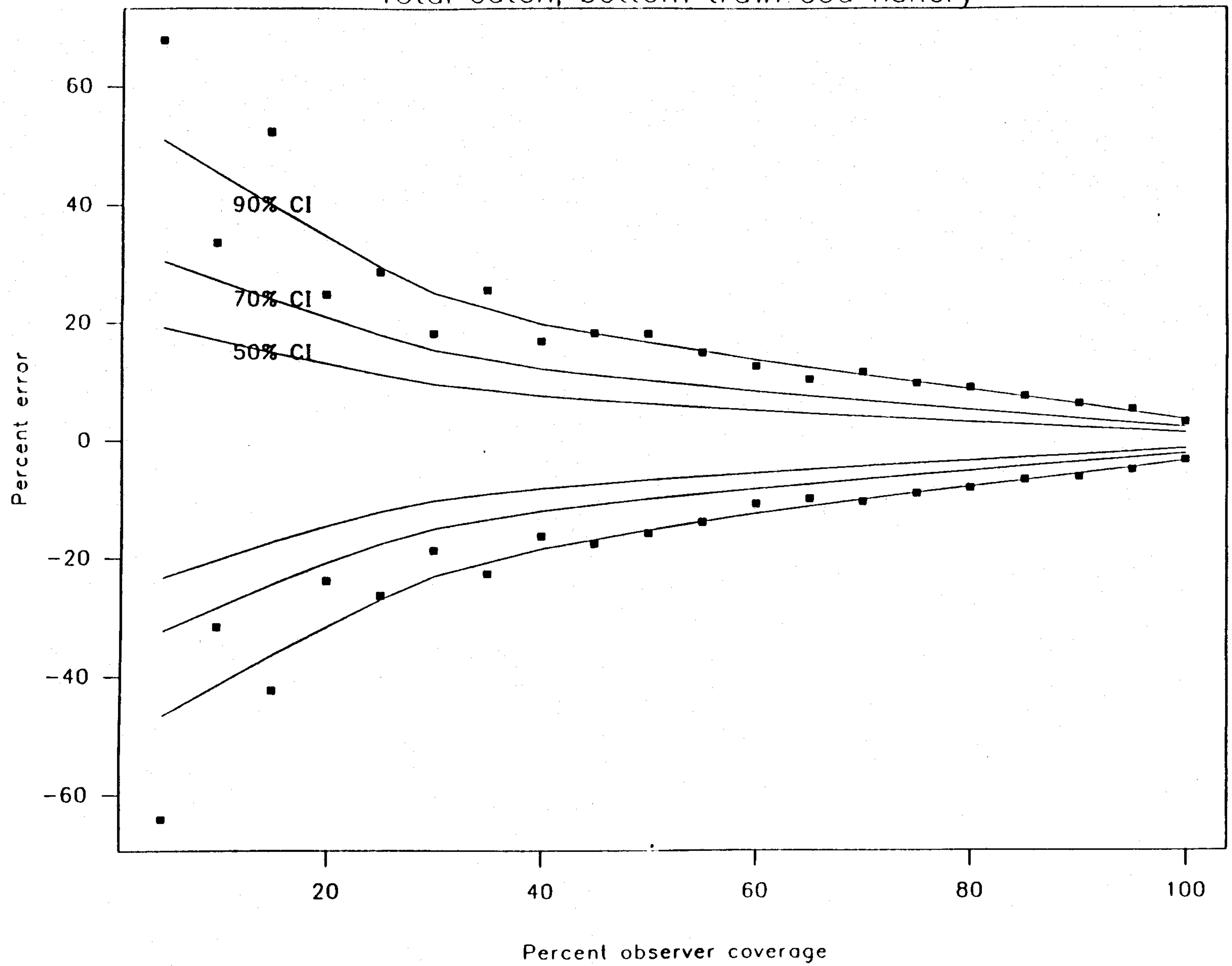


Fig 14

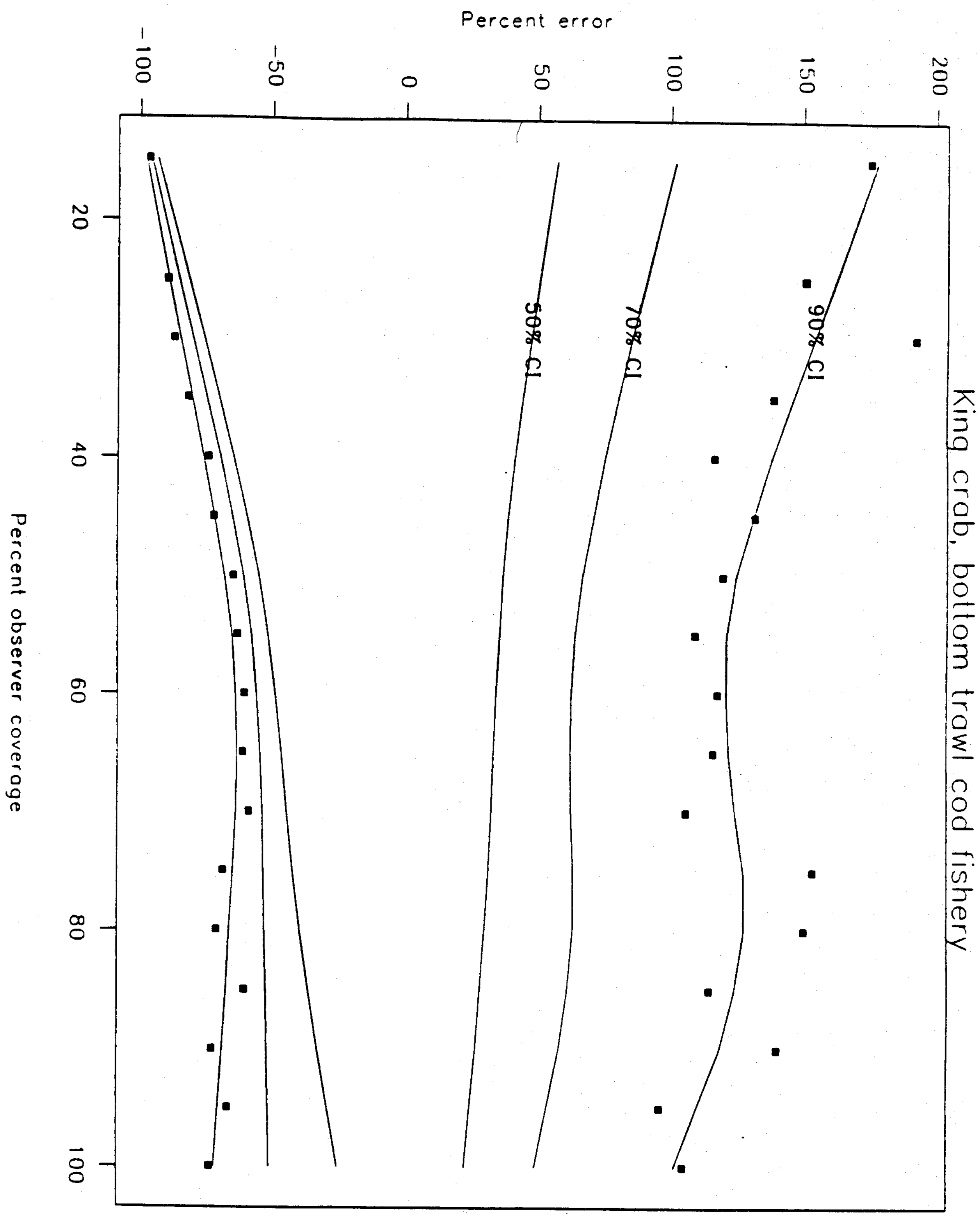
King crab (numbers per ton)

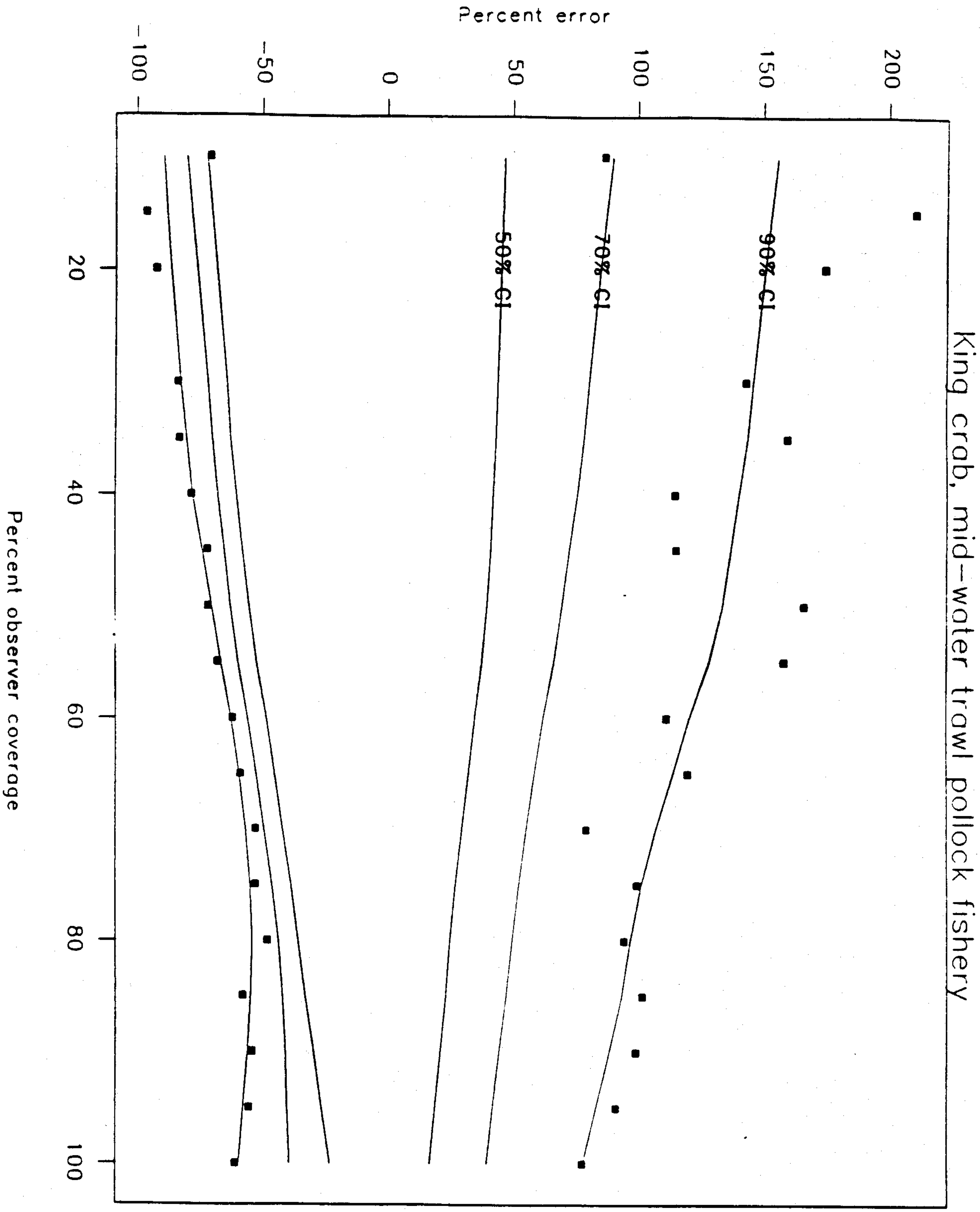
A. Pollock mid-water fishery

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.0005	0.0005	0.4928	0.0002	0.0010	78.8
20	0.0001	0.0001	0.8879	0.0000	0.0003	133.6
30	0.0054	0.0055	0.7865	0.0009	0.0131	113.5
40	0.0001	0.0001	0.5860	0.0000	0.0002	96.5
50	0.0103	0.0101	0.8077	0.0029	0.0275	119.1
60	0.0147	0.0147	0.5453	0.0056	0.0310	86.7
70	0.0005	0.0005	0.4494	0.0002	0.0009	66.1
80	0.0046	0.0047	0.4622	0.0024	0.0091	71.4
90	0.0104	0.0108	0.4911	0.0048	0.0208	76.8
100	0.0092	0.0091	0.4257	0.0036	0.0163	69.3

B. Bottom trawl cod fishery

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.0000	0.0000	NA	0.0000	0.0000	NA
20	0.0000	0.0000	NA	0.0000	0.0000	NA
30	0.0003	0.0004	0.9826	0.0000	0.0010	139.8
40	0.0015	0.0015	0.6135	0.0004	0.0033	95.4
50	0.0112	0.0110	0.6020	0.0040	0.0248	92.3
60	0.0100	0.0098	0.6051	0.0040	0.0218	89.2
70	0.0230	0.0233	0.5569	0.0095	0.0474	82.4
80	0.0132	0.0133	0.7253	0.0039	0.0332	110.7
90	0.0133	0.0134	0.6696	0.0036	0.0321	106.5
100	0.0156	0.0160	0.5273	0.0041	0.0320	89.2


King crab, bottom trawl cod fishery
Percent error
-100
-50
0
50
100
150
200
Percent observer coverage
20
40
60
80
100
90% CI
70% CI
50% CI


King crab, mid-water trawl pollock fishery
Percent error
200
150
100
50
0
-50
-100
90% CI
70% CI
50% CI
20
40
60
80
100
Percent observer coverage

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Alaska Fisheries Science Center
Resource Ecology and Fisheries
Management Division
7600 Sand Point Way Northeast
Bin C15700, Building 4
Seattle, Washington 98115-0070

April 20, 1992 F/AKC2:MWD

MEMORANDUM FOR: Richard Marasco, Russ Nelson

FROM: Martin Dorn Martin Dorn

SUBJECT: Analysis of observer coverage levels for additional groundfish fisheries

Ren Narita and I have put together an analysis of three additional target fisheries using the procedures described in the draft document "An evaluation of observer coverage levels in Alaska groundfish fisheries." The attached figures and tables describe the effect of changes in the percent observer coverage on confidence intervals for the species composition of the catch. The following three fisheries were analyzed.

A. Bering sea longline cod fishery.

A vessel met this target criteria if it fished with longline gear and the weekly proportion of cod was greater than 45 percent. The data set used in the analysis was 121 observer vessel-weeks (primary sampling units) during weeks 22-30 of 1991. The total catch during this period was 14,539.92 mt. The level of sampling on longline vessels is higher than on trawl vessels. Seventy-nine percent of all sets made during this period were sampled (1,083 out of 1,369). Estimates of the total catch, and species composition for Pacific cod, sablefish, red rockfish, and halibut were investigated (Table 1, Figures 1-6).

B. Bering sea flatfish trawl fishery.

A vessel met this target criteria if it fished with trawl gear and its weekly catch of rock sole, yellowfin sole and other flatfish was greater than 40 percent. In addition, the catch of yellowfin sole and other flatfish had to be greater than the catch of rock sole. The data set used in the analysis was 144 observer vessel-weeks during weeks 19-24 of 1991. The total catch during this period was 41,793.16 mt. Fifty-four percent of the hauls were sampled (1,499 out of 2,797). Estimates of the total catch, and species composition for yellowfin sole, halibut, tanner crab, and king crab were investigated (Table 2, Figures 7-12).

C. Bering sea rock sole trawl fishery.

A vessel met this target criteria if it fished with trawl gear and its weekly catch of rock sole, yellowfin sole and other flatfish was greater than 40 percent. In addition, the catch of rock sole had to be greater than the catch of yellowfin sole and other flatfish. The data set used in the analysis was 120 observer vessel-weeks during weeks 0-22 of 1991. The total catch during this period was 59,281.07 mt. Thirty-seven percent of the hauls were sampled (1,313 out of 3,658). Estimates of total catch, and species composition for yellowfin sole, halibut, tanner crab, and king crab were investigated (Table 3, Figures 13-18).

Table 1. Species composition and bootstrap estimates of 90 percent confidence intervals for the Bering sea longline cod fishery for different levels of observer coverage. The coefficient of variation is the standard deviation divided by estimate. The percent error of the 90% confidence interval is calculated by 1/2(90% *upper b.* - 90% *lower b.*)/(*est.prop.*) × 100.

A. Pacific cod (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.8018	0.8002	0.0377	0.7475	0.8497	6.4
20	0.7789	0.7787	0.0237	0.7476	0.8084	3.9
30	0.8065	0.8056	0.0185	0.7806	0.8290	3.0
40	0.7914	0.7921	0.0161	0.7706	0.8122	2.6
50	0.8192	0.8191	0.0094	0.8059	0.8312	1.5
60	0.7907	0.7908	0.0076	0.7808	0.8002	1.2
70	0.8076	0.8076	0.0071	0.7977	0.8164	1.2
80	0.8022	0.8021	0.0061	0.7942	0.8100	1.0
90	0.7992	0.7990	0.0044	0.7930	0.8048	0.7
100	0.8007	0.8007	0.0020	0.7981	0.8033	0.3

B. Sablefish (kg per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.0000	0.0000	---	0.0000	0.0000	---
20	2.0019	1.9951	0.9050	0.1533	5.4129	131.4
30	1.5362	1.5508	0.8602	0.2086	4.2193	130.5
40	1.4888	1.5238	0.5758	0.4260	3.0769	89.0
50	0.9724	0.9859	0.7102	0.2639	2.3250	106.0
60	0.4086	0.4064	0.4085	0.1573	0.7206	68.9
70	0.0127	0.0128	0.3134	0.0071	0.0200	50.9
80	0.8781	0.8762	0.3309	0.5181	1.4187	51.3
90	0.7663	0.7600	0.2329	0.5329	1.1020	37.1
100	0.6912	0.6950	0.0902	0.5930	0.8032	15.2

C. Red rockfish (kg per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	Upper	Pcnt. err.
10	3.0855	3.2501	1.1195	0.0219	9.6632	156.2
20	1.4531	1.4479	0.7292	0.2093	3.4202	110.5
30	1.9102	1.9333	0.5723	0.3399	3.8185	91.1
40	1.4972	1.5301	0.4843	0.5098	2.8515	78.2
50	1.3147	1.3130	0.4573	0.4771	2.3820	72.4
60	0.7906	0.7961	0.4136	0.3965	1.4255	65.1
70	0.5049	0.5076	0.4492	0.2558	0.9442	68.2
80	0.9767	0.9679	0.2449	0.6400	1.4195	39.9
90	0.8689	0.8702	0.1994	0.6419	1.2006	32.1
100	0.7938	0.7938	0.1160	0.6610	0.9609	18.9

D. Halibut (kg per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	Upper	Pcnt. err.
10	48.4850	49.5487	0.2004	36.2738	67.6943	32.4
20	41.4095	41.3057	0.1875	29.5304	54.8397	30.6
30	41.4891	41.6499	0.1572	32.1456	53.5165	25.8
40	48.0301	48.0387	0.1286	38.6900	58.8018	20.9
50	38.5324	38.5049	0.1031	32.4530	45.5455	17.0
60	44.0265	43.9597	0.0678	39.2380	48.9076	11.0
70	42.0535	41.9889	0.0631	37.7603	46.6791	10.6
80	47.3331	47.3582	0.0498	43.6762	51.5373	8.3
90	45.6617	45.7506	0.0374	43.1356	48.8038	6.2
100	44.4177	44.3645	0.0161	43.2474	45.5872	2.6

Table 2. Species composition and bootstrap estimates of 90 percent confidence intervals for the Bering sea flatfish trawl fishery for different levels of observer coverage. The coefficient of variation is the standard deviation divided by estimate. The percent error of the 90% confidence interval is calculated by 1/2(90% *upper b.* - 90% *lower b.*)/(*est.prop.*) × 100.

A. Yellowfin sole (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.7173	0.7175	0.0968	0.5912	0.8262	16.4
20	0.7616	0.7594	0.0532	0.6871	0.8219	8.8
30	0.7626	0.7657	0.0372	0.7195	0.8157	6.3
40	0.7507	0.7529	0.0325	0.7110	0.7923	5.4
50	0.7801	0.7795	0.0197	0.7537	0.8042	3.2
60	0.7739	0.7737	0.0202	0.7469	0.7976	3.3
70	0.7824	0.7819	0.0152	0.7615	0.8011	2.5
80	0.7754	0.7754	0.0122	0.7599	0.7899	1.9
90	0.7705	0.7702	0.0096	0.7581	0.7821	1.6
100	0.7675	0.7676	0.0057	0.7606	0.7746	0.9

B. Halibut (kg per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	2.6320	2.6545	0.3852	1.2138	4.4913	62.3
20	2.2386	2.2984	0.3999	1.1426	3.9791	63.4
30	2.4355	2.4413	0.2872	1.4638	3.7367	46.7
40	2.2005	2.1941	0.2261	1.5150	3.1530	37.2
50	2.1411	2.1543	0.1585	1.6541	2.7680	26.0
60	1.9952	2.0105	0.1504	1.5619	2.5399	24.5
70	2.2460	2.2547	0.1207	1.8554	2.7404	19.7
80	2.5478	2.5462	0.0918	2.1877	2.9673	15.3
90	2.2292	2.2365	0.0780	1.9745	2.5443	12.8
100	2.2740	2.2745	0.0483	2.0922	2.4628	8.1

C. Tanner crab (all species) (no. per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	Upper	Pcnt. err.
10	22.3771	22.7090	0.5065	7.3360	42.7373	79.1
20	12.5140	12.9417	0.4535	4.6442	23.2584	74.4
30	5.0899	5.1784	0.4162	2.0764	8.9814	67.8
40	10.1282	10.2448	0.2987	5.9852	15.6546	47.7
50	10.6631	10.7141	0.2785	6.4674	15.9256	44.4
60	13.2402	13.2621	0.1825	9.5774	17.5114	30.0
70	8.4882	8.5295	0.1862	6.2839	11.4231	30.3
80	14.9013	15.0792	0.1287	12.2030	18.3984	20.8
90	10.4016	10.4607	0.1259	8.5824	12.7557	20.1
100	11.6108	11.6031	0.0840	9.9855	13.2522	14.1

D. King crab (no. per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	Upper	Pcnt. err.
10	0.4123	0.3860	0.5472	0.0238	0.7602	89.3
20	0.2912	0.3018	0.5321	0.0702	0.5860	88.6
30	0.3490	0.3375	0.3577	0.1462	0.5536	58.4
40	0.2562	0.2503	0.3342	0.1245	0.4005	53.9
50	0.2300	0.2294	0.2125	0.1574	0.3127	33.8
60	0.1489	0.1482	0.2305	0.0971	0.2082	37.3
70	0.3046	0.3066	0.1858	0.2242	0.4153	31.4
80	0.2157	0.2169	0.1806	0.1628	0.2919	29.9
90	0.2699	0.2704	0.1316	0.2229	0.3323	20.3
100	0.2691	0.2703	0.1031	0.2280	0.3218	17.4

Table 3. Species composition and bootstrap estimates of 90 percent confidence intervals for the Bering sea rock sole trawl fishery for different levels of observer coverage. The coefficient of variation is the standard deviation divided by estimate. The percent error of the 90% confidence interval is calculated by 1/2(90% *upper b.* - 90% *lower b.*)/(*est.prop.*) × 100.

A. Rock sole (proportion by weight)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	0.4702	0.4700	0.0536	0.4276	0.5106	8.8
20	0.5147	0.5129	0.0493	0.4704	0.5523	7.9
30	0.4728	0.4718	0.0570	0.4273	0.5148	9.3
40	0.4817	0.4810	0.0350	0.4541	0.5080	5.6
50	0.4574	0.4575	0.0330	0.4329	0.4836	5.5
60	0.4672	0.4675	0.0280	0.4471	0.4890	4.5
70	0.4699	0.4700	0.0229	0.4524	0.4882	3.8
80	0.4683	0.4690	0.0182	0.4552	0.4839	3.1
90	0.4808	0.4809	0.0172	0.4678	0.4956	2.9
100	0.4781	0.4781	0.0127	0.4683	0.4880	2.1

B. Halibut (kg per metric ton of groundfish catch)

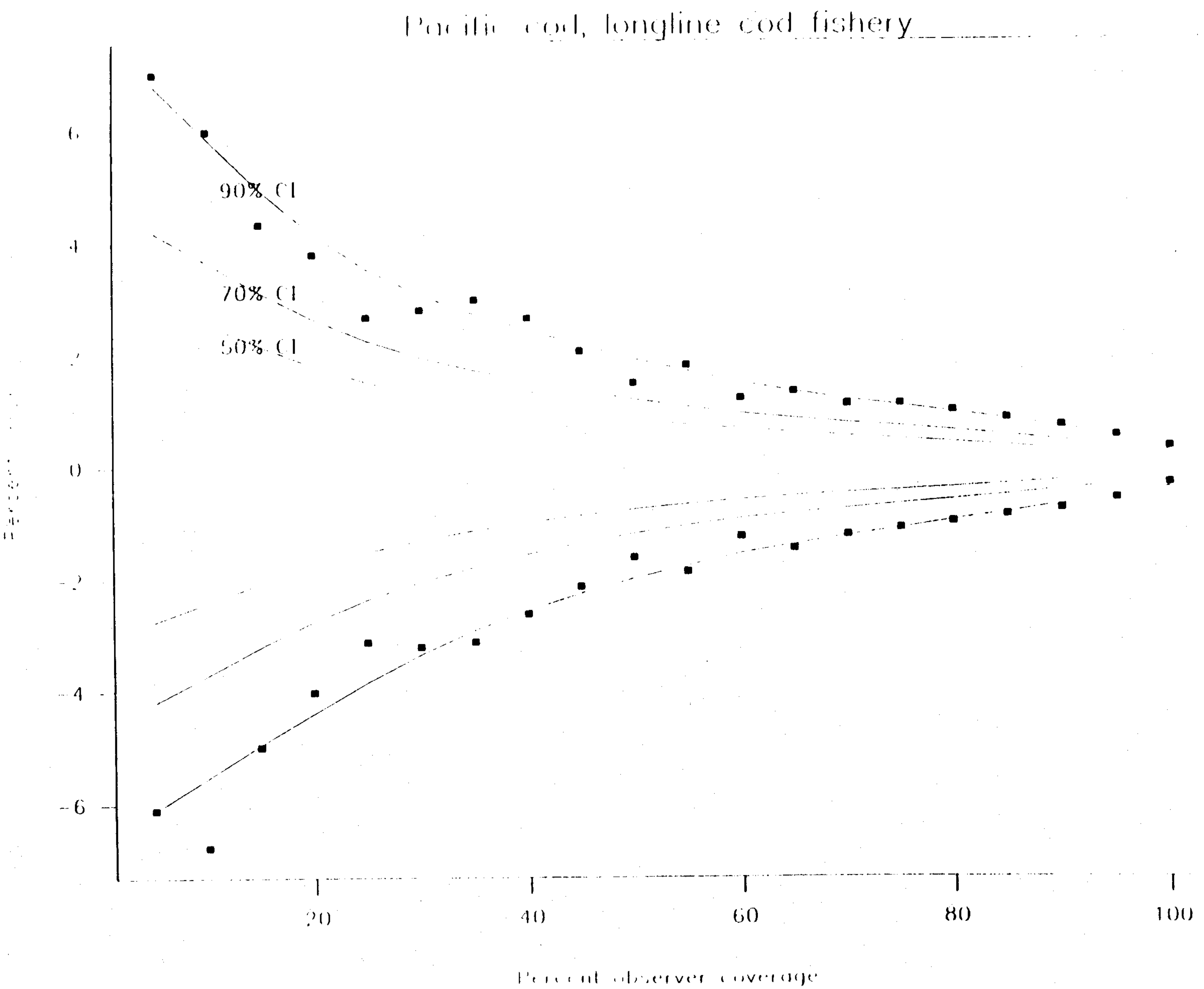
Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	90% CI Upper	Pcnt. err.
10	17.9406	18.0978	0.2330	11.7811	25.3803	37.9
20	13.8560	13.8843	0.1080	11.4828	16.4538	17.9
30	15.2028	15.2169	0.1372	11.9318	18.7918	22.6
40	15.1036	15.1317	0.0862	13.1773	17.3891	13.9
50	15.2428	15.2777	0.0700	13.5702	17.1153	11.6
60	15.2340	15.2271	0.0657	13.6317	16.9329	10.8
70	13.9405	13.9449	0.0458	12.8812	14.9645	7.5
80	15.1111	15.1233	0.0464	13.9859	16.3266	7.7
90	15.5184	15.5080	0.0383	14.5759	16.4879	6.2
100	15.1311	15.1008	0.0265	14.4453	15.7630	4.4

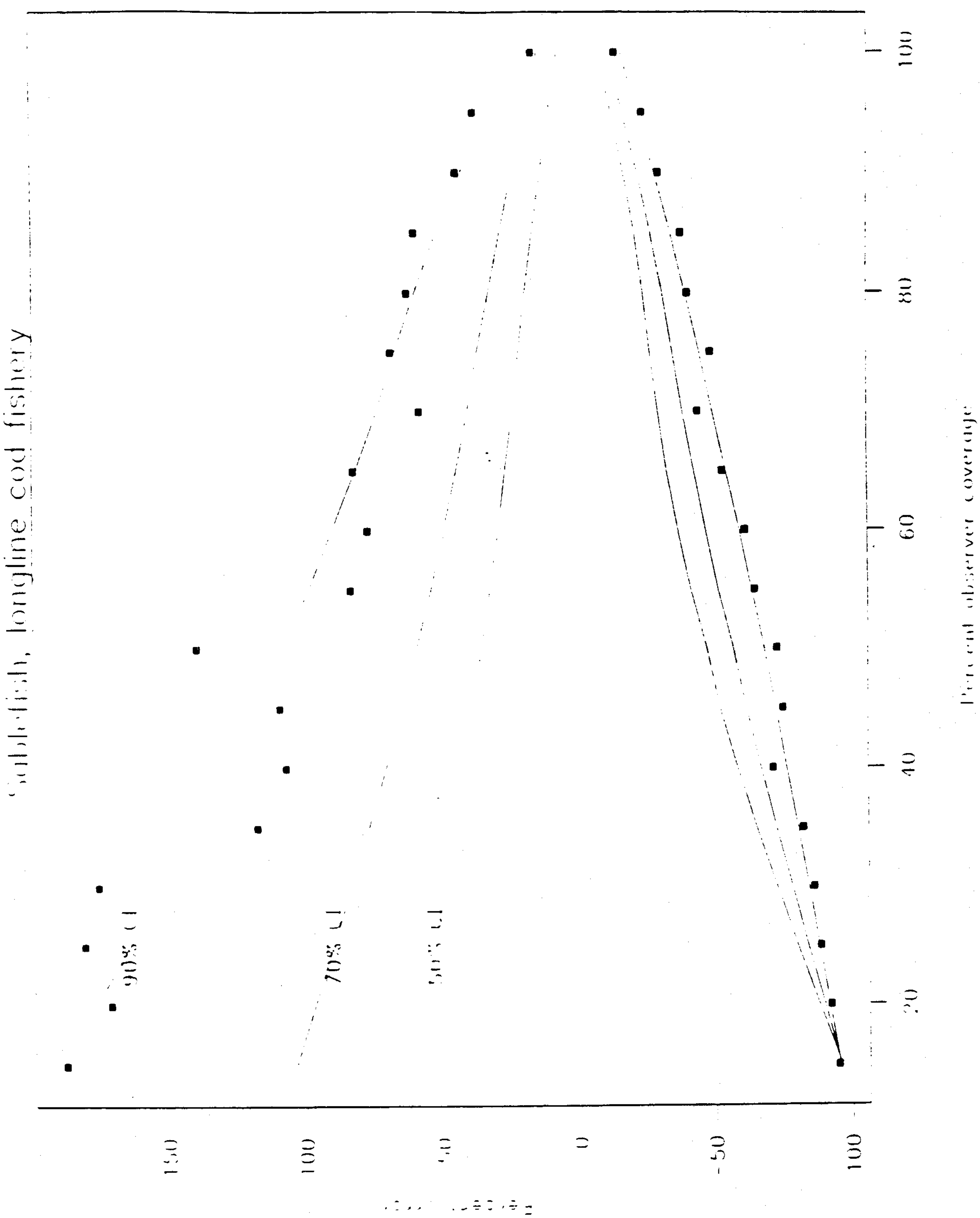
C. Tanner crab (all species) (no. per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	Upper	Pcnt. err.
10	19.9542	19.7415	0.4309	7.4338	35.7459	70.9
20	19.9779	19.9642	0.2970	11.9405	31.1815	48.2
30	20.0736	20.2905	0.2614	13.0175	29.7712	41.7
40	16.4879	16.5338	0.1506	12.7933	21.0431	25.0
50	47.6585	48.1539	0.6908	29.9600	73.2161	45.4
60	40.9413	40.4771	0.2299	28.3696	57.9793	36.2
70	34.4350	34.4846	0.2207	24.6192	48.9065	35.3
80	30.5234	30.4856	0.1906	23.2757	42.1695	30.9
90	33.1611	32.9396	0.1317	27.7042	41.7565	21.2
100	32.0577	32.0213	0.0899	27.6989	37.0916	14.6

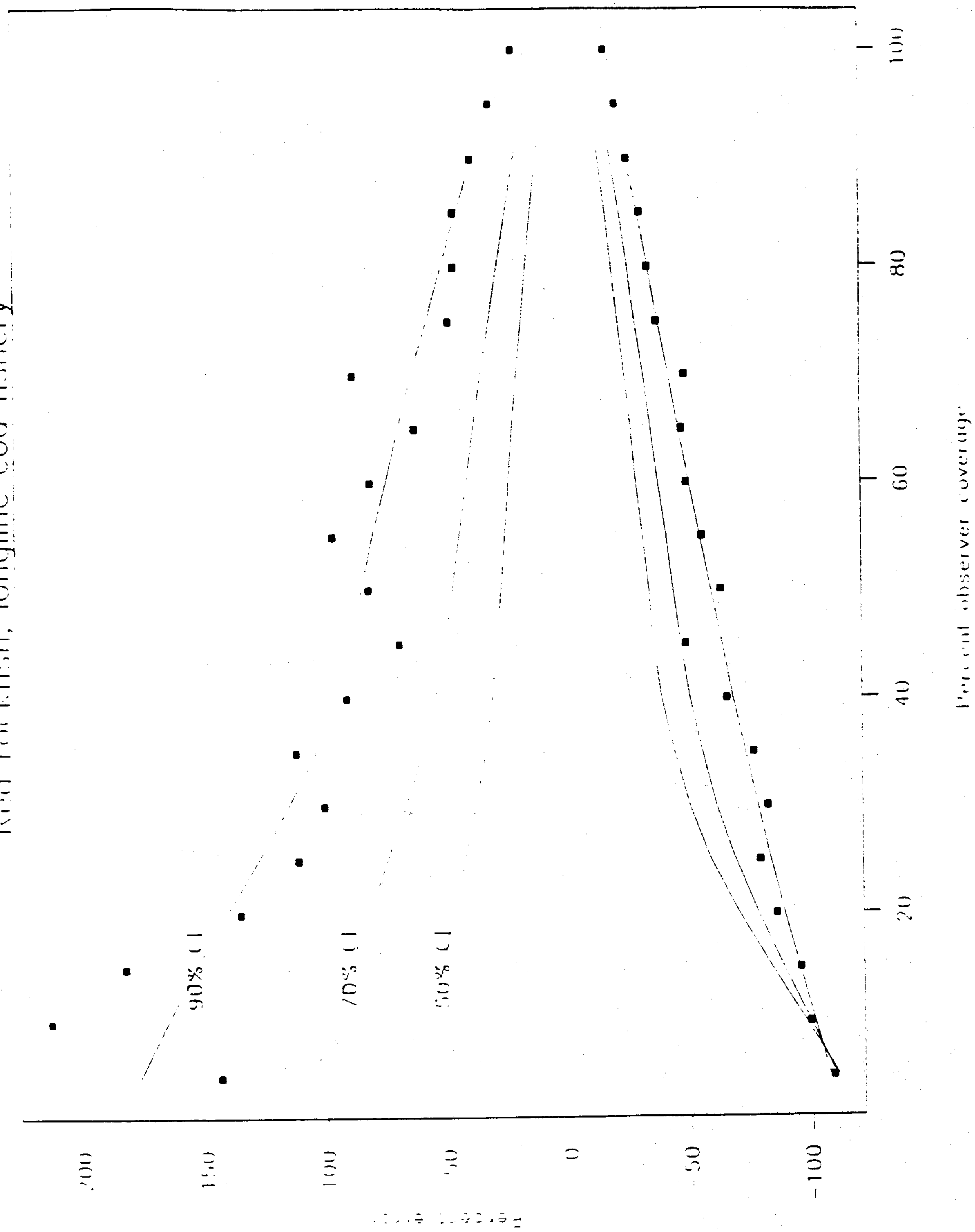
D. King crab (no. per metric ton of groundfish catch)

Percent of vessels	Estimate	Bootstrap mean	CV	90% CI Lower	Upper	Pcnt. err.
10	0.6232	0.6429	0.5244	0.2035	1.2271	82.1
20	1.3651	1.3773	0.3360	0.7388	2.2249	54.4
30	0.7390	0.7339	0.2841	0.4269	1.1051	45.9
40	1.5151	1.5170	0.2439	0.9810	2.1722	39.3
50	1.2210	1.2093	0.1744	0.8820	1.5838	28.7
60	1.3597	1.3784	0.1946	0.9982	1.8610	31.7
70	1.0461	1.0386	0.1245	0.8383	1.2705	20.7
80	1.2161	1.2138	0.1443	0.9681	1.5544	24.1
90	1.1720	1.1738	0.1283	0.9588	1.4513	21.0
100	1.1731	1.1772	0.1096	0.9886	1.3975	17.4

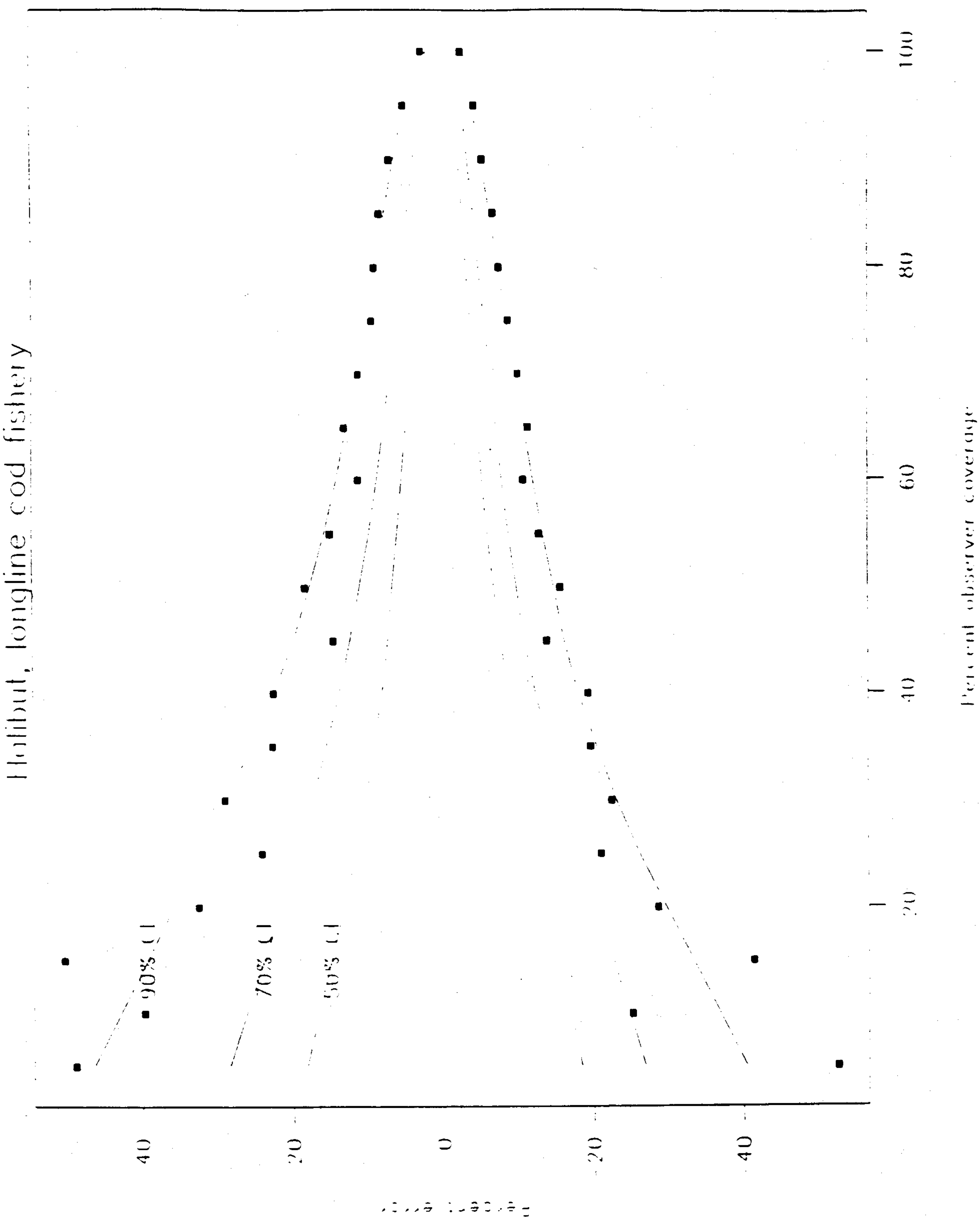

Pacific cod, longline cod fishery
90% CI
70% CI
50% CI
6
4
0
-2
-4
-6
20
40
60
80
100
Percent observer coverage

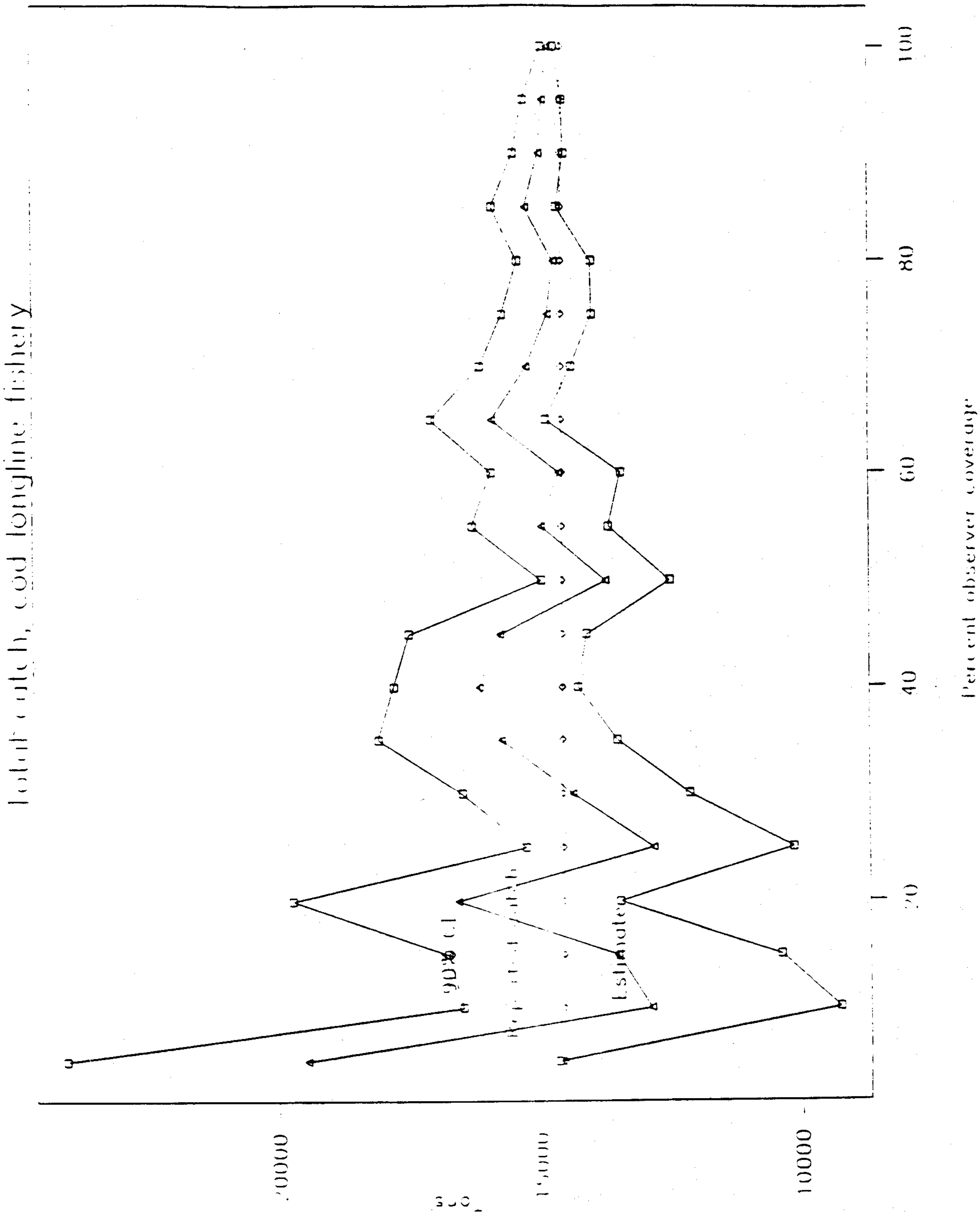


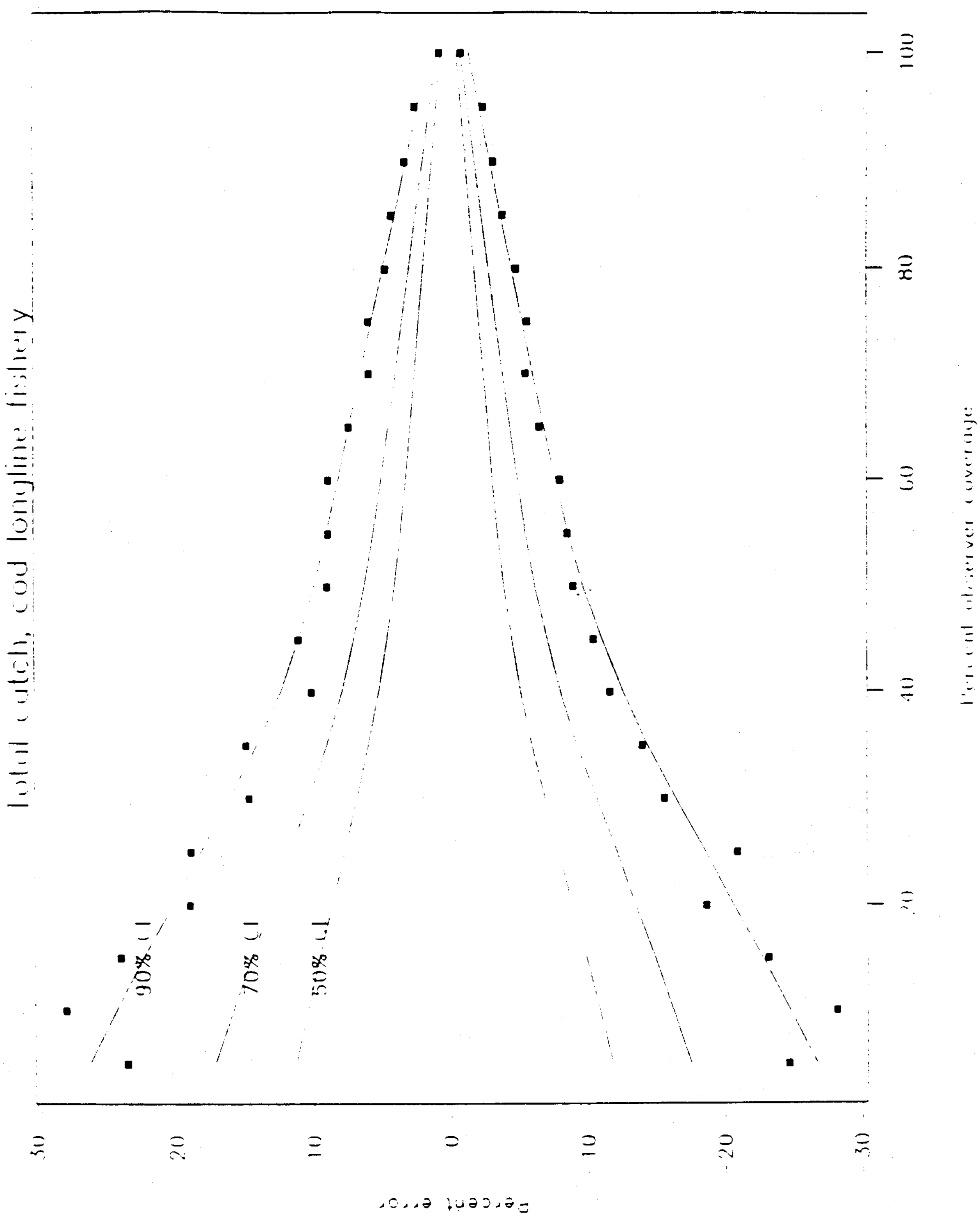
Sablefish, longline cod fishery
90% CI
70% CI
50% CI
Percent observer coverage
20
40
60
80
100
150
100
50
0
-50
-100

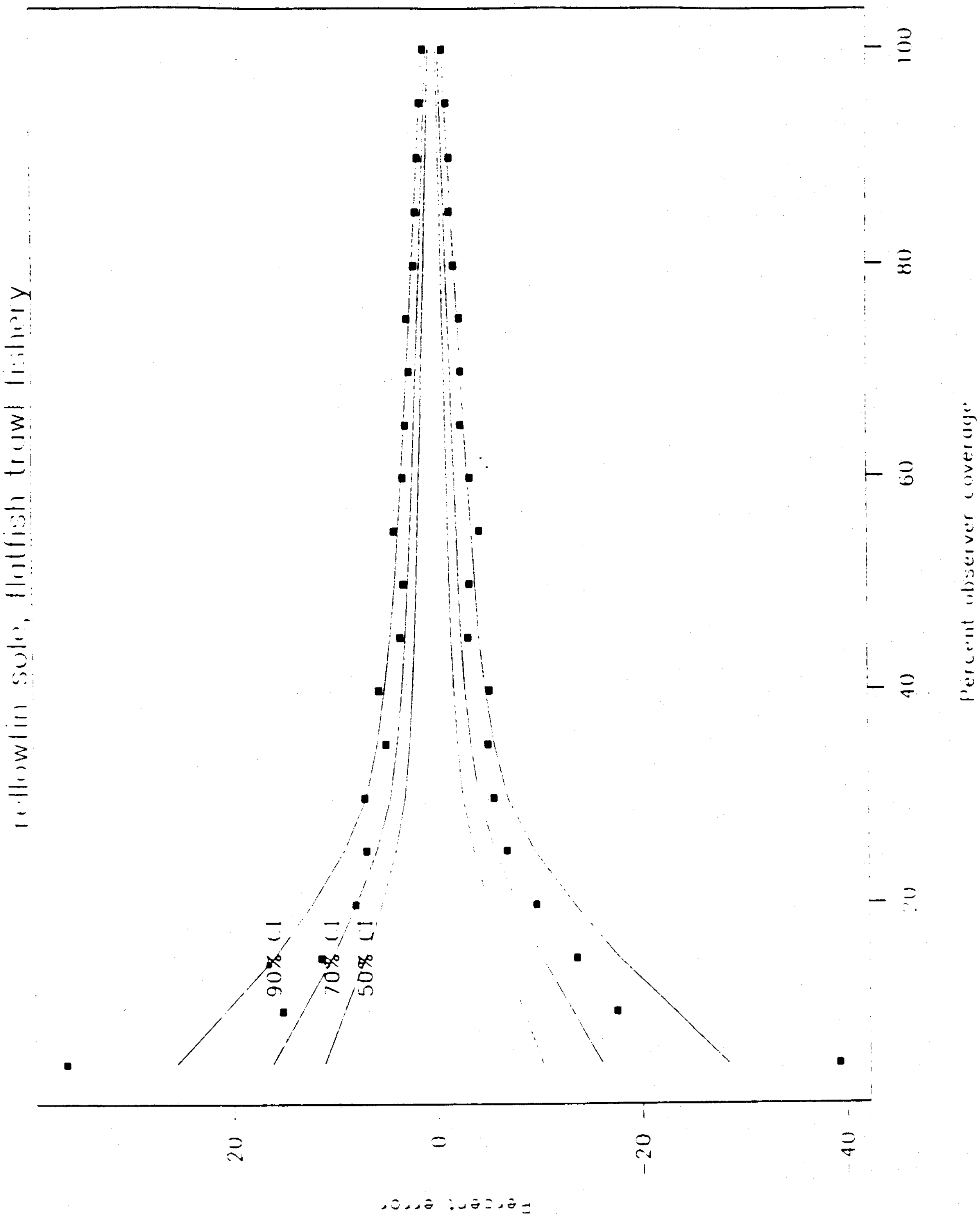


Red rockfish, longline cod fishery
90% CI
70% CI
50% CI
200
150
100
50
0
50
-100
20
40
60
80
100
Percent observer coverage

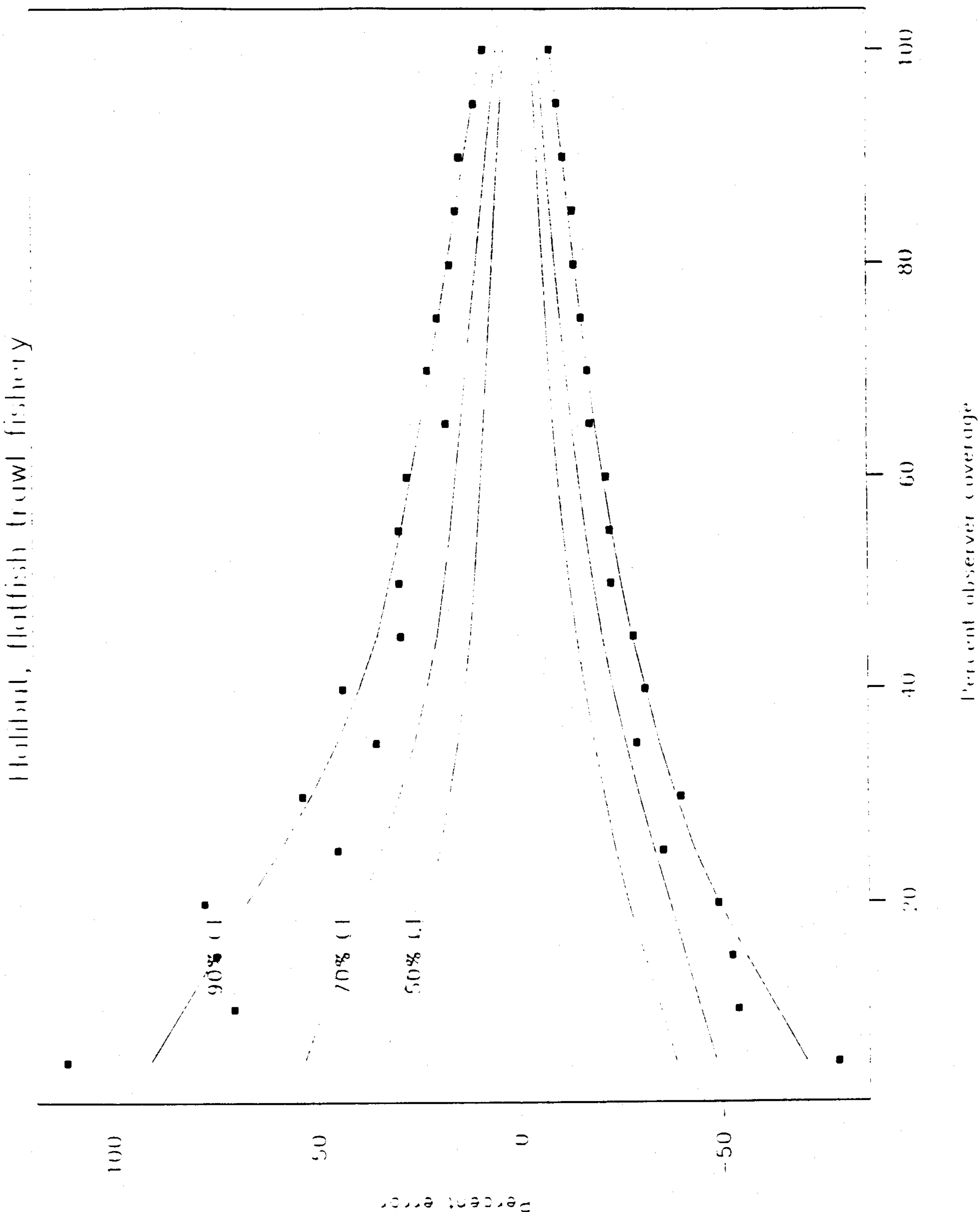

Halibut, longline cod fishery
90% CI
70% CI
50% CI
40
20
0
20
40
20
40
60
80
100
Percent observer coverage

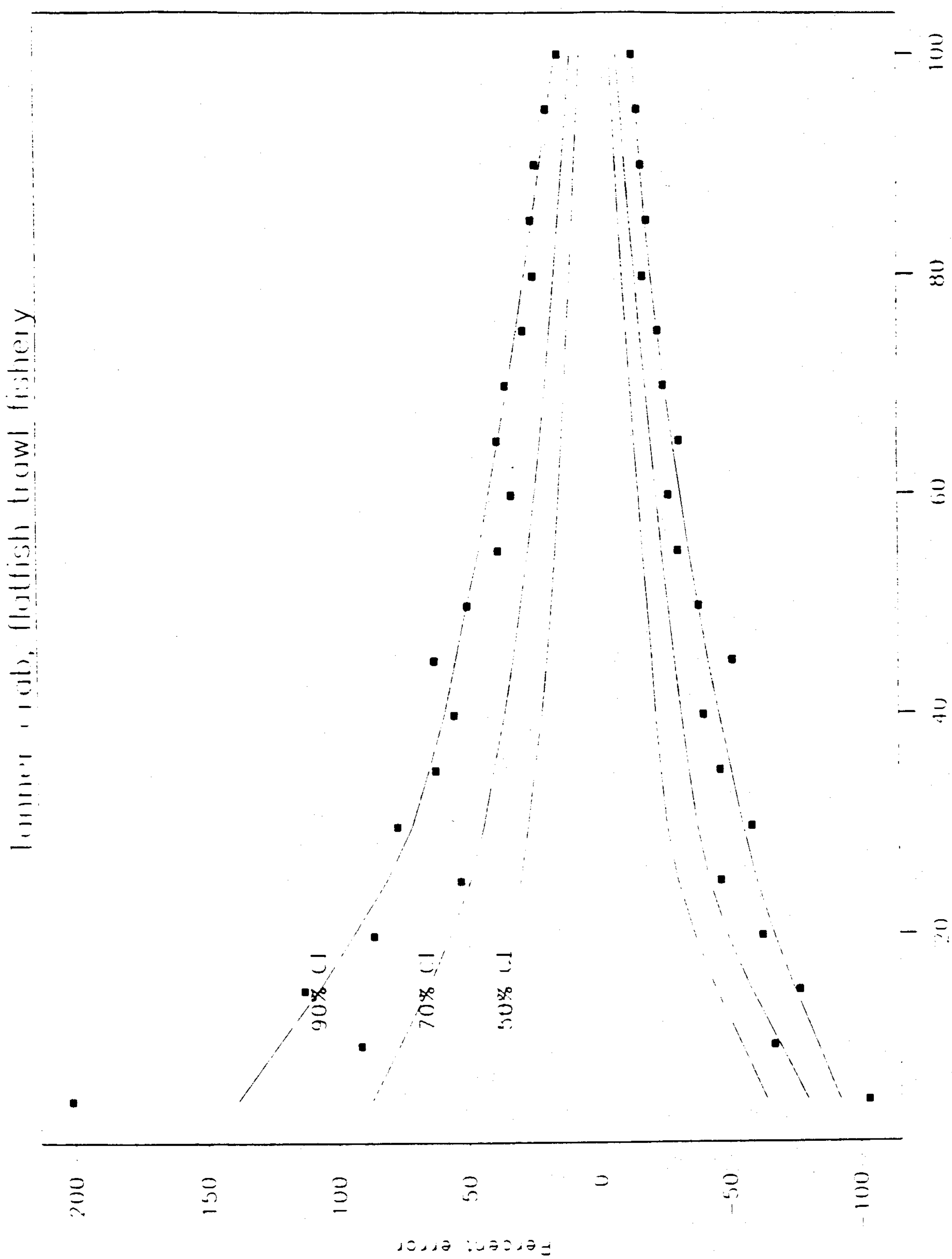

Total catch, cod longline fishery
90% CI
Estimated
10000
20
40
60
80
100
Percent observer coverage

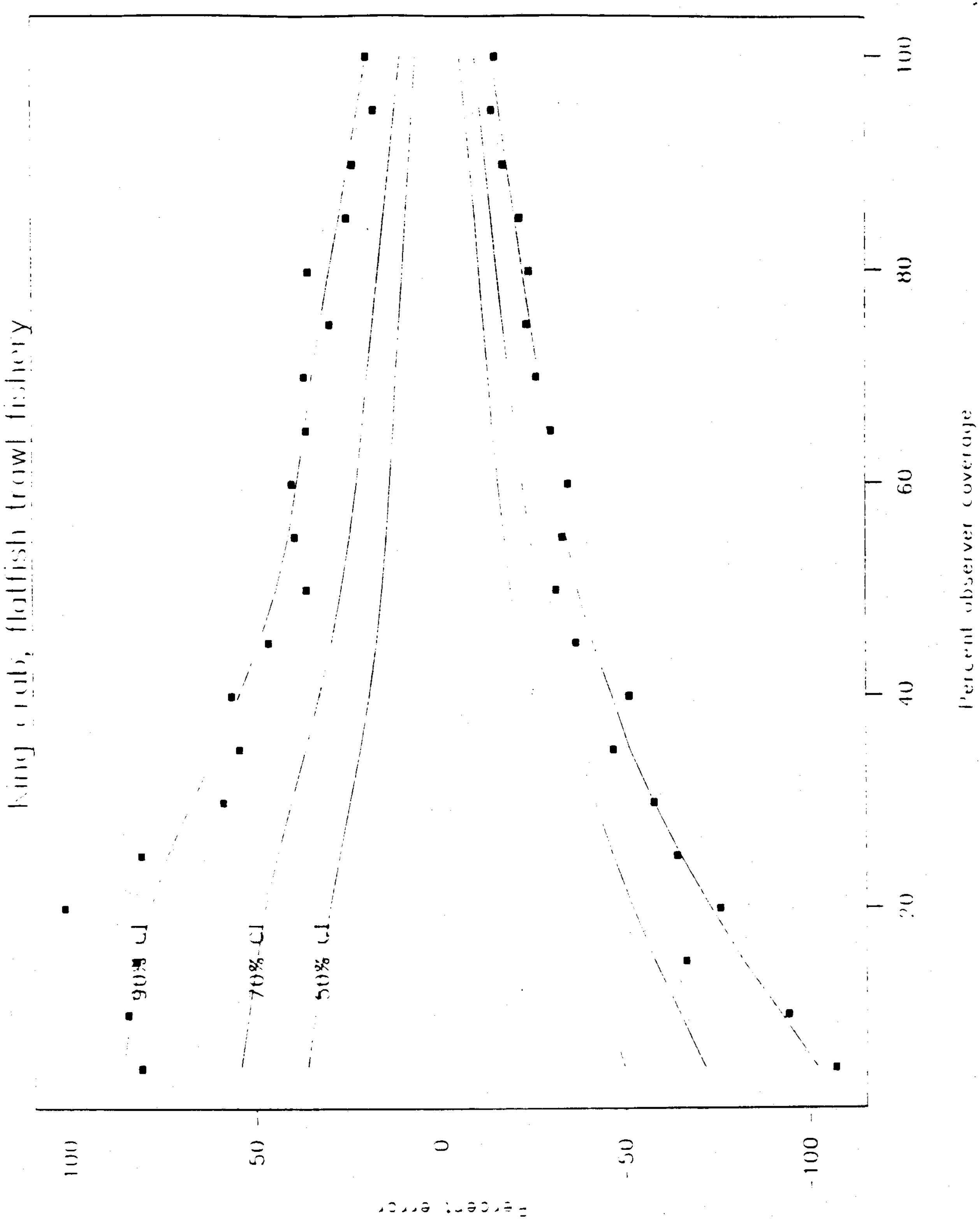

Total catch, cod longline fishery
90% CI
70% CI
50% CI
Percent observer coverage
20
40
60
80
100
Percent error
30
20
10
0
-10
-20
-30

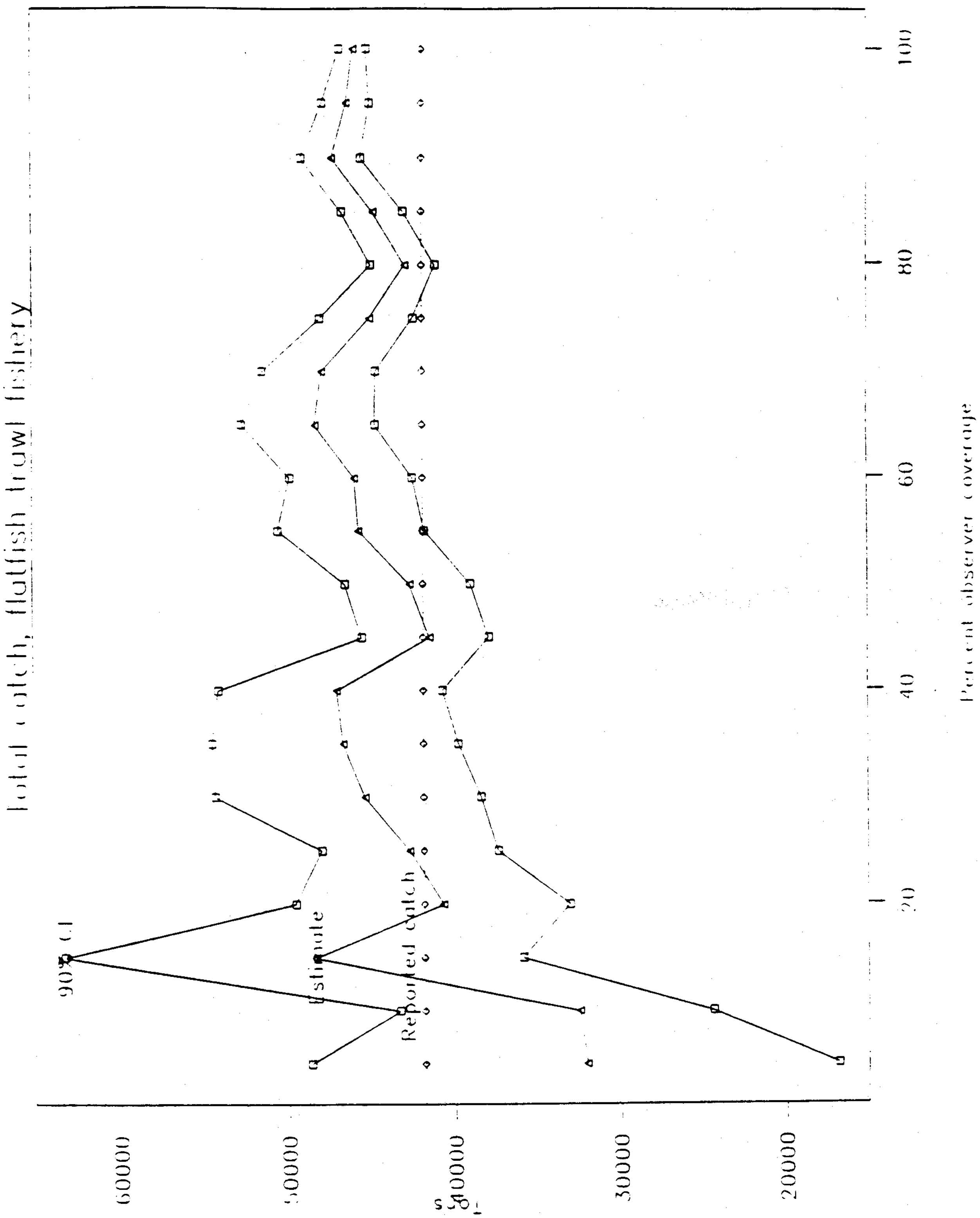


ellowfin sole, flatfish trawl fishery
90% CI
70% CI
50% CI
Percent observer coverage
20
40
60
80
100
Percent error
20
0
-20
-40


Halibut, flatfish trawl fishery
90% CI
70% CI
50% CI
100
50
0
-50
Percent error
20
40
60
80
100
Percent observer coverage

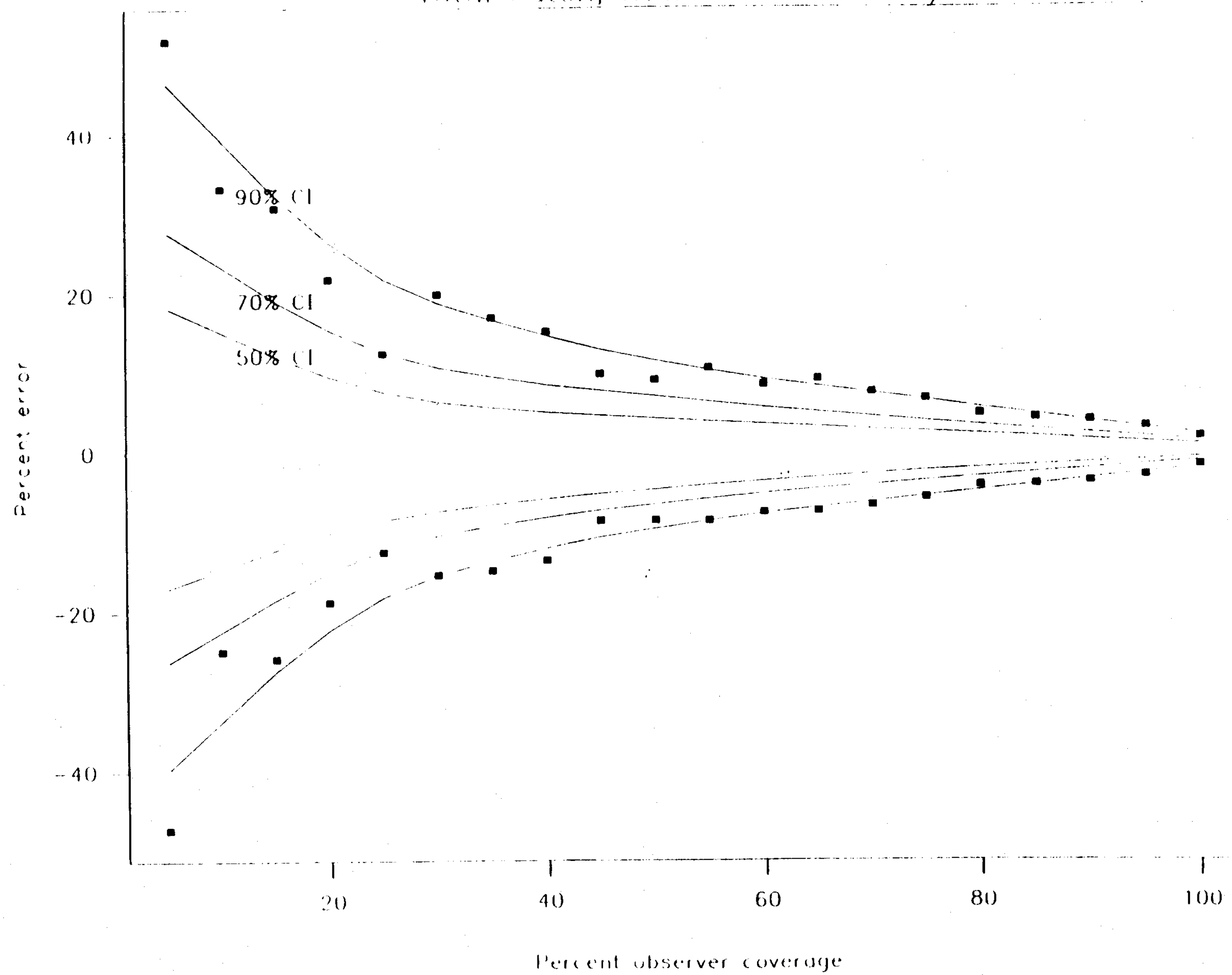

Tanner crab, flatfish trawl fishery
90% CI
70% CI
50% CI
200
150
100
50
0
-50
-100
Percent error
20
40
60
80
100
Percent observer coverage

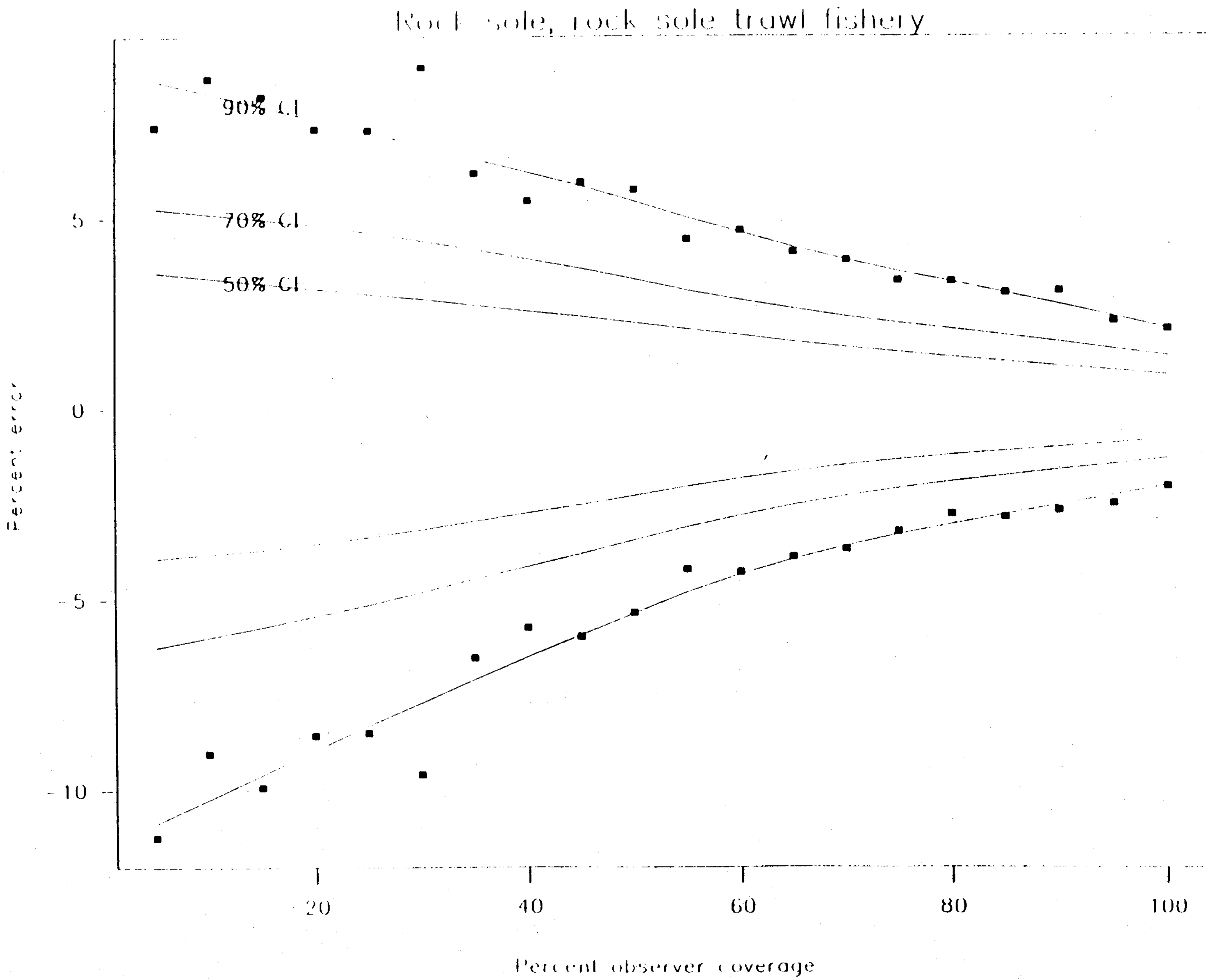

King crab, flatfish trawl fishery
90% CI
70% CI
50% CI
Percent error
100
50
0
-50
-100
Percent observer coverage
20
40
60
80
100

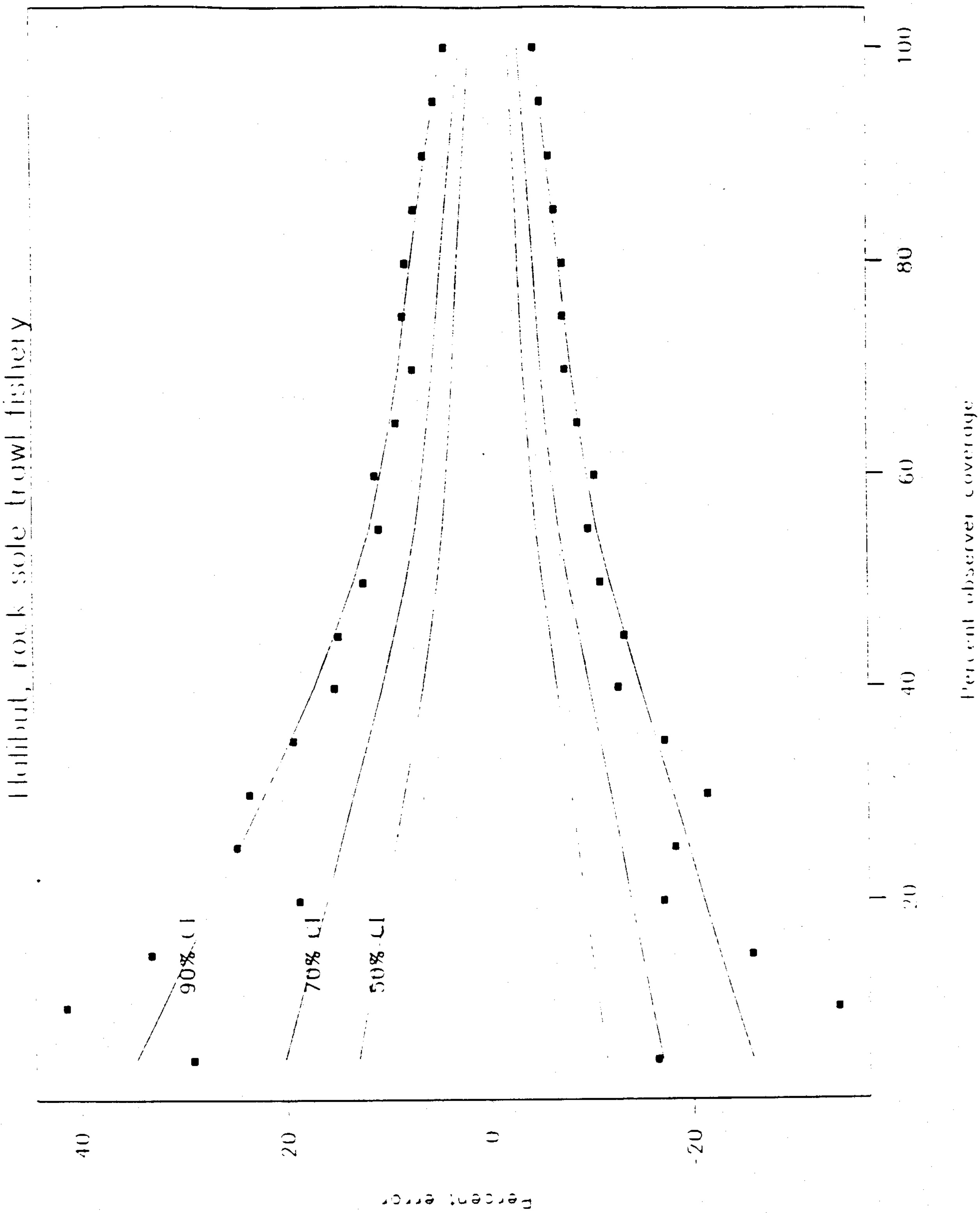


Total catch, flatfish trawl fishery
90% CI
Estimate
Reported catch
60000
50000
40000
30000
20000
20
40
60
80
100
Percent observer coverage

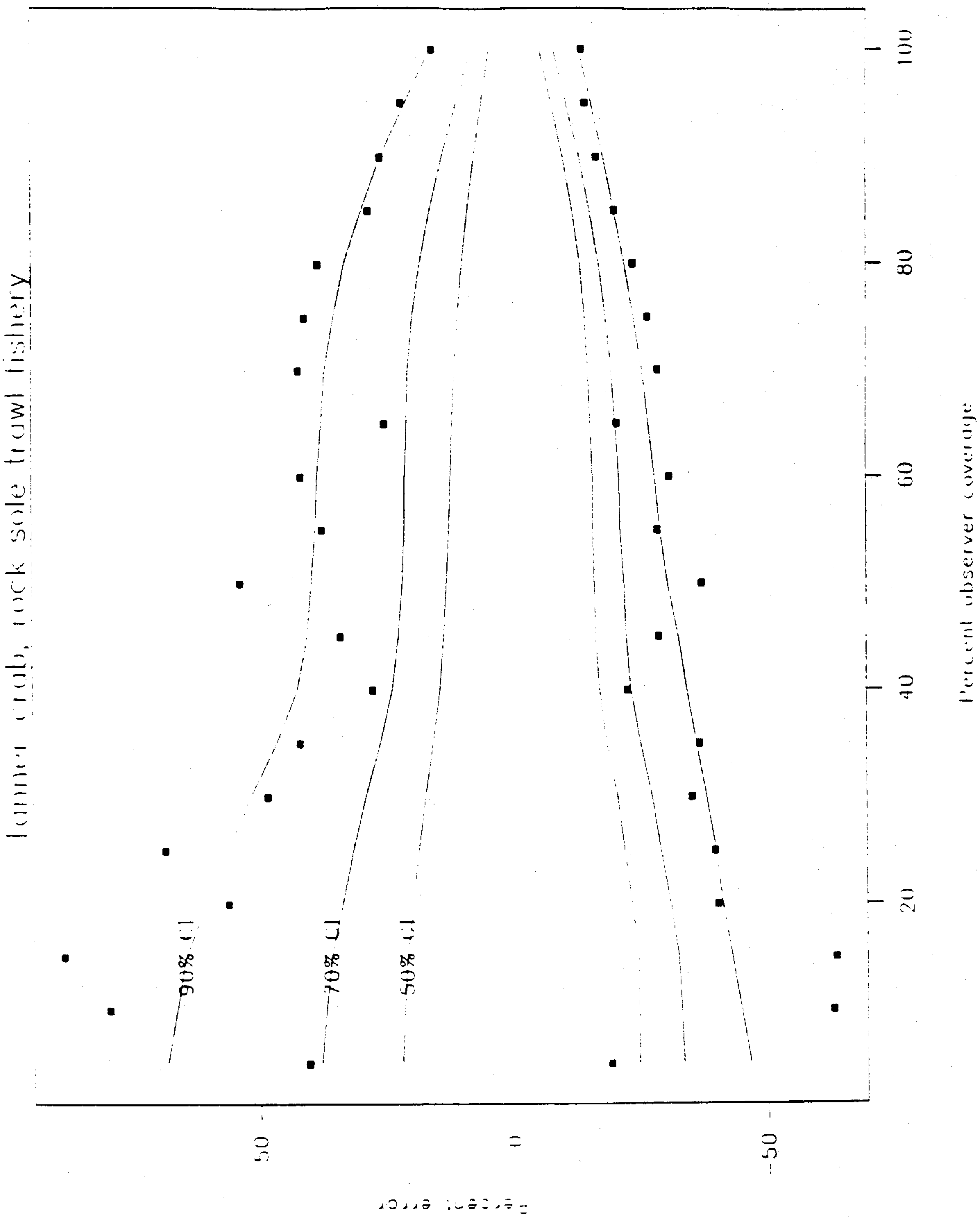
Total catch, flatfish trawl fishery



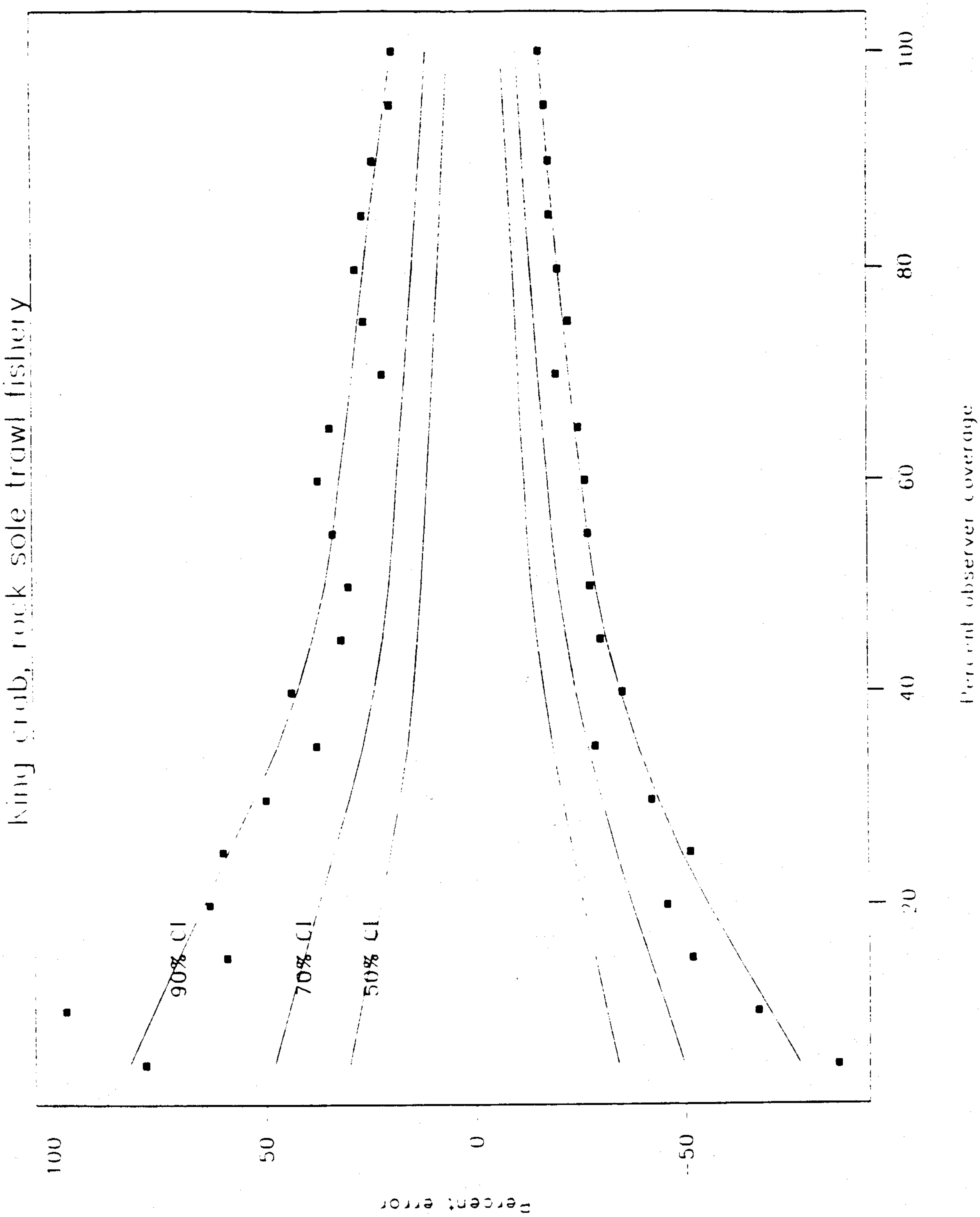

Rock sole, rock sole trawl fishery
90% CI
70% CI
50% CI
5
0
-5
-10
Percent error
20
40
60
80
100
Percent observer coverage

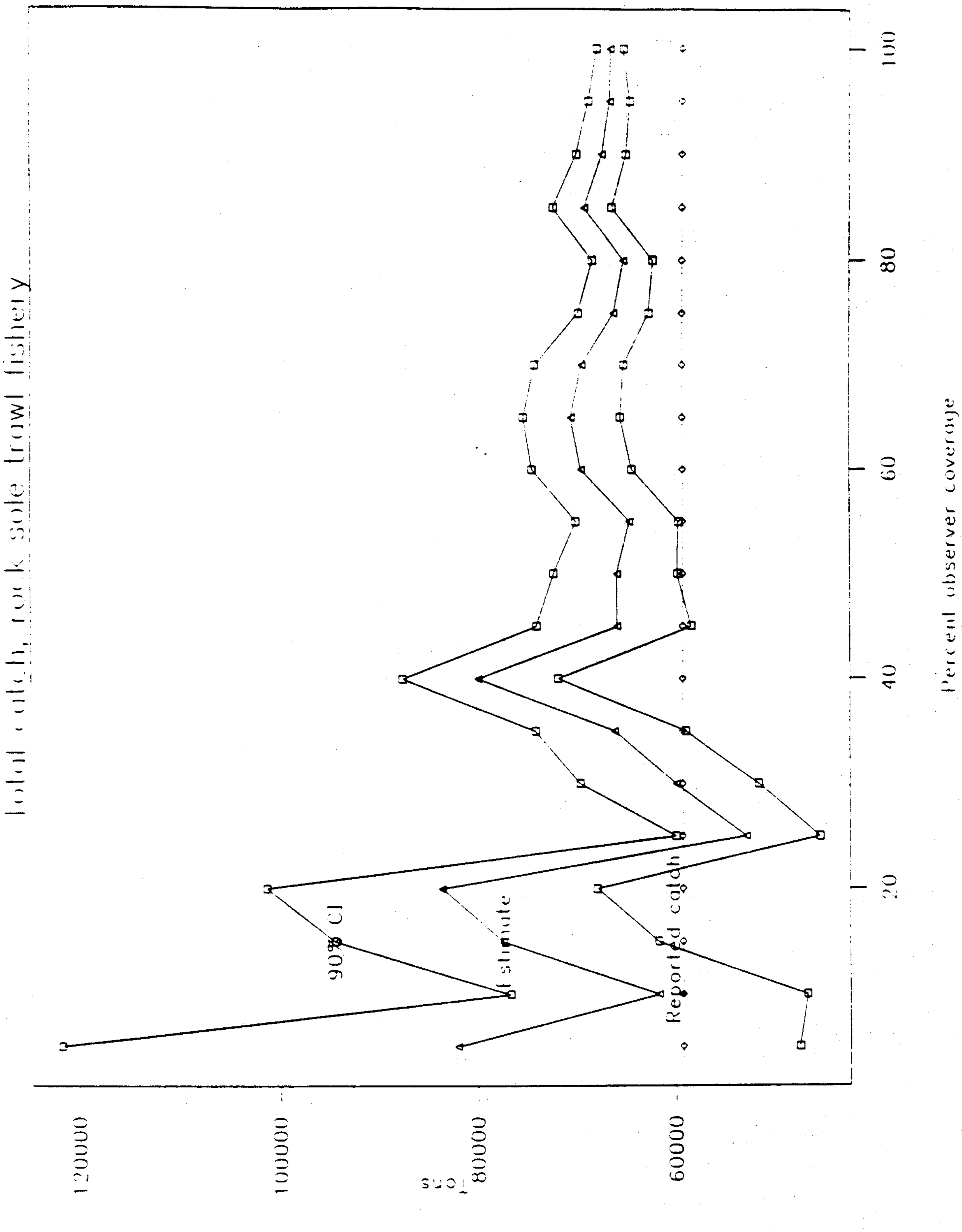


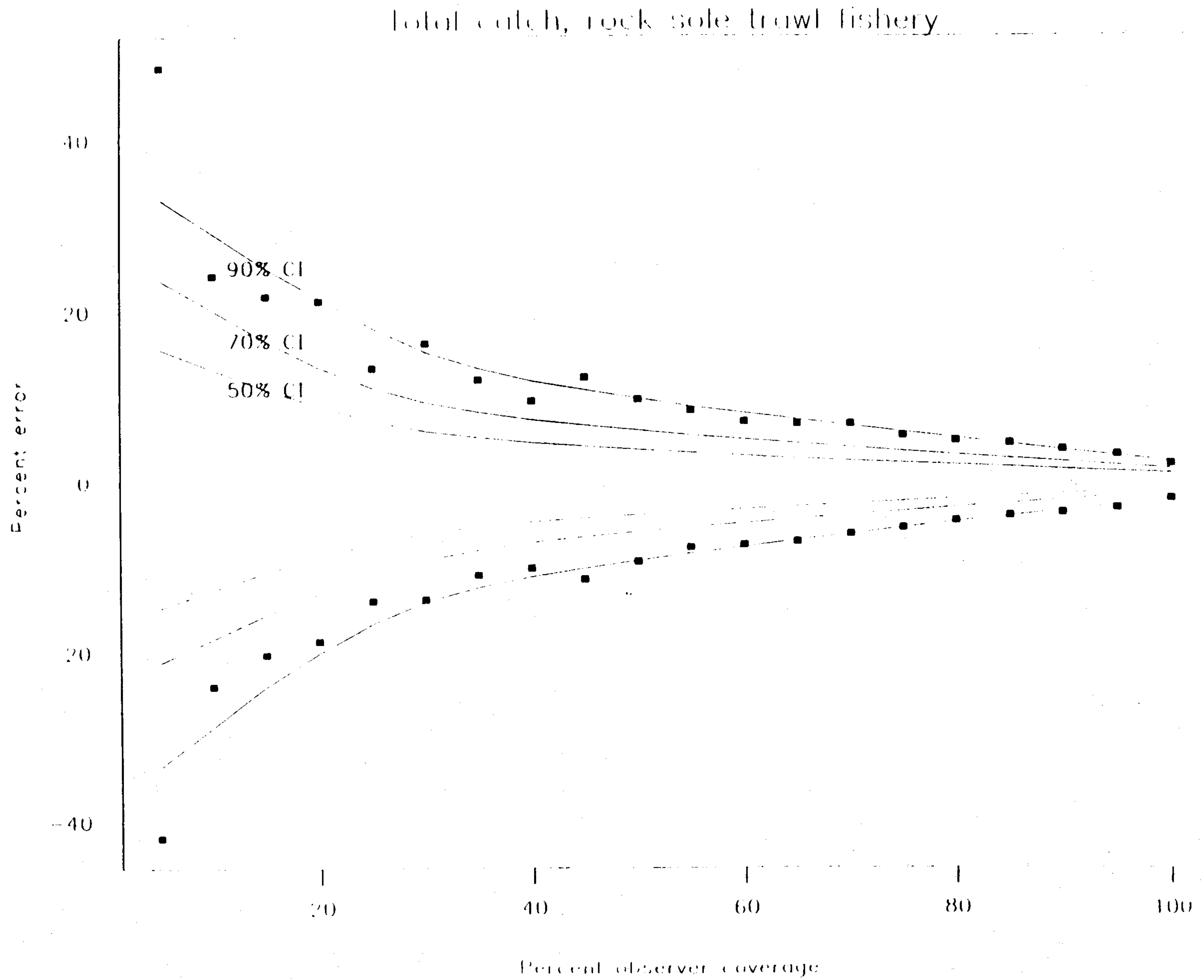
Halibut, rock sole trawl fishery
90% CI
70% CI
50% CI
40
20
0
-20
Percent error
20
40
60
80
100
Percent observer coverage



Tanner crab, rock sole trawl fishery
90% CI
70% CI
50% CI
Percent error
50
0
-50
Percent observer coverage
20
40
60
80
100


King crab, rock sole trawl fishery
90% CI
70% CI
50% CI
Percent error
100
50
0
-50
Percent observer coverage
20
40
60
80
100


Total catch, rock sole trawl fishery
90% CI
Estimate
Reported catch
Tons
120000
100000
80000
60000
20
40
60
80
100
Percent observer coverage


Total catch, rock sole trawl fishery
90% CI
70% CI
50% CI
40
20
0
-20
-40
Percent error
20
40
60
80
100
Percent observer coverage

Analysis of Levels of Observer Coverage

Prepared by

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January, 1992

Analysis of Levels of Observer Coverage

The National Marine Fisheries Service and the North Pacific Fishery Management Council have identified three primary objectives for the domestic groundfish observer program. The three objectives are contained within the Draft Outline/Framework for the North Pacific Fisheries Research Plan submitted to the Council for its consideration at the January, 1992 meeting. The primary objectives of the program are to collect data from the groundfish fishery:

1. to perform in-season management of the fishery through estimation of catches of groundfish, prohibited species and marine mammals;

2. to estimate bycatch rates of individual vessels for the implementation of individual vessel incentive programs; and,

3. to accommodate assessments of the status of stocks.

To date, the focus of the analyses of domestic observer data to determine appropriate levels of observer sampling (or coverage) has been to address objectives 1 and 2; estimation of catches for in-season management and implementation of vessel incentive programs. All indications are that the levels of coverage required to carry out either one of these two objectives will provide the opportunity to collect the data needed to support the stock assessments objective of the program.

Under the current domestic observer program, vessels from 60 feet length overall (LOA) up to 125 feet LOA are required to carry an observer on 30% of their days during fishing trips in each calendar quarter of the year in which they fish more than 10 days. In an attempt to determine whether 30% is an acceptable level of coverage, some of the 1991 domestic observer data were analyzed. Halibut catches were estimated from these data using various sampling levels or levels of coverage. The methods used to conduct the analysis and estimate catches of halibut are provided in the attached description of the methods used by Dr. Russell Kappenman. This analysis concluded that greater than 90% observer coverage was needed to insure that 90% of the time subsampled based bycatch estimates differed from the full data based bycatch estimates by less than 10%. Though this analysis was not extended to other species, it is expected that the results would be similar.

In 1991, an individual vessel incentive program was implemented for three target fisheries in the Bering Sea/Aleutian Islands and two fisheries in the Gulf of Alaska. Analysis of data associated with potential violations of the vessel incentive program have been conducted throughout the last half on 1991 and are continuing in 1992. These analyses have shown that essentially 100% observer coverage is needed to obtain sufficient numbers of samples to estimate a bycatch rate for a vessel and a valid confidence limit. A technical description of the procedures used is currently being written.

As a result of the above analyses, the recommended level of observer coverage to achieve two of the three primary objectives of the groundfish program is 100%. The sampling requirements of the third objective would be achieved if the needs for estimating catches and incentive programs are met.

However, there are other considerations which affect whether or not the desired level of 100% can be achieved. One consideration is the size of a vessel and its ability to accommodate an observer. Under the current program, vessels under 60 feet LOA are not required to meet mandatory levels of coverage because of their small size and the small proportion of the total groundfish catch taken by that segment of the fleet. The size of the vessel is also associated with safety of the crew and observer and operational aspects of the vessels and their fisheries which create practical problems in achieving observer coverage. Vessels from 60 feet LOA up to 125 feet LOA are required to have 30% coverage. This decision was made because of considerations for cost of observers to vessel owners, size of the vessels and ability to accommodate observers 100% of the time, and the proportion of catch accounted for by these vessels.

A second important consideration is whether there is sufficient funding to provide 100% coverage of all vessels able to accommodate observers. The 1% cap on the levels of fees collected by the Research Plan is insufficient to fund the present groundfish program. The present program and increased levels of coverage cannot be provided unless the Research Plan contains provisions for a supplemental program where those required to carry observers cover the unfunded portions of the program or Congress amends the Magnuson Act to increase the 1% cap on fees.

In light of these considerations, we will be evaluating the current coverage categories for vessels and processors to determine whether changes can be made to allow a larger portion of the fishery to be accounted for by 100% coverage and still afford the program. We will also be looking at alternative methods for estimating catches from those segments of the fishery which cannot maintain 100% coverage. We must recognize that segments of the fishery without observer coverage or coverage significantly less than 100% cannot be included in individual vessel incentive programs.

Observer Coverage for Small Fishing Vessels
by Russ Kappenman

In an attempt to find an appropriate observer coverage percentage for 60 to 125 ft. vessels, some 1991 observer data were analyzed. Ten vessels with 100% observer coverage were selected from among those vessels which delivered their retained catches to shoreside processing plants and were issued fish tickets by the plants.

Attention was focused on the estimation of total bycatch of halibut by each of the vessels, and the method used was that one described in "A Procedure for Estimating Discards."(Attached) This method uses the round weights, given by fish tickets, of the species delivered to a plant by a vessel and information obtained by an observer by sampling some of the hauls which led to issuance of the fish tickets. For each sample taken from a haul, whether it be a whole haul sample or a pooled basket sample, the observer determines the weights of all species present in the sample.

The fish ticket and observer data for each of the ten selected vessels were used to perform a series of simulation studies, one corresponding to each vessel. The first step in each of these studies was the estimation of total halibut bycatch by use of all of the data for a vessel. Once this estimate was obtained, a measure of the effectiveness of any specified (less than 100%) observer coverage was found by repeatedly selecting at random a fixed number of the original observer samples. This fixed number is the specified observer coverage multiplied by the total number of hauls sampled by the observer.

Each time a fixed number of the original observer samples was selected at random, the information in these samples and the fish ticket information was used to find an estimate of halibut bycatch. The same bycatch estimation procedure was applied to the full data set and to each sub-sample from it.

One can compare the bycatch estimates obtained by repeatedly subsampling observer data with the bycatch estimate based on all of the observer data. The percentage of the time the subsample based bycatch estimates differ from the full data based bycatch estimate by, say, less than 10% may be taken to be a measure of the effectiveness of a specified observer coverage.

Our simulation studies repeatedly indicated that greater than 90% observer coverage is needed to insure that 90% of the time subsample based bycatch estimates differ from the full data based bycatch estimates by less than 10%.

A PROCEDURE FOR ESTIMATING DISCARDS

The following is a description of a procedure for estimating the amounts of various species of fish caught and discarded by the fishing fleet.

The vessels in the fleet will be grouped into the following categories:

I. vessels which deliver the retained portion of their catches to shoreside or to floating processing plants which issue fish tickets for the round weights of species delivered.

II. catcher-processor vessels

III. vessels which deliver their hauls of fish to a mothership.

We will first consider the group of vessels which belong to category I, and discards will be estimated on a vessel by vessel basis for this group. For each species of interest, the amount caught and discarded by any vessel in the time period between two consecutive deliveries of retained catch by the vessel to a processor will be estimated as follows.

Suppose that k different species are delivered by the vessel to a processor, and a fish ticket is issued by the processor to the vessel. The ticket gives the round weights of the k species delivered by the vessel. Denote these round weights by $T_{x_1}, \ldots, T_{x_k}$.

Suppose further that n of the hauls made by the vessel in the relevant time period are sampled by an observer. For the j-th sample, $j=1,\ldots,n$, let x_{ij} represent the weight of the i-th processed species in the sample, for $i=1,\ldots,k$, and y_j represent the weight, in the sample, of any discarded species whose catch weight is to be estimated.

If T_y represents the total catch weight of the discarded species, for the period, an estimate of T_y is

$$\hat{T}_y = w_1 r_1 T_{x_1} + \ldots + w_k r_k T_{x_k} . \qquad (1)$$

Here,

$$r_s = \left(\sum_{j=1}^{n} y_j\right) / \sum_{j=1}^{n} x_{sj} \, , \qquad (2)$$

for $s=1,\ldots,k$, and the coefficients $w_1, \ldots, w_k$ are given by the solution to the matrix equation

$$(w_1 \ldots w_k) = \frac{E\, A^{-1}}{E\, A^{-1}\, E'} \, , \qquad (3)$$

where E is the $k\times 1$ vector whose elements are all one, and A is the $k\times k$ matrix whose (s,t) element, for $s,t=1,\ldots,k$, is

$$a_{st} = \frac{1}{n-1} \sum_{h=1}^{n} (y_h - r_s x_{sh})(y_h - r_t x_{th}).$$

If, for a given vessel and fishing time period between two retained catch deliveries, some of the hauls taken are whole haul sampled and some are basket sampled, the two sets of samples should be treated separately. Each set would be used, as described above, to estimate discarded species weights. For each discarded species, the final discarded weight estimate, in this case, would be the weighted average

$$\frac{n_1}{n} \hat{T}_y^{(1)} + \frac{n_2}{n} \hat{T}_y^{(2)} \, , \qquad (4)$$

where n is the total number of hauls sampled, n_1 of these were whole haul sampled, n_2 were basket sampled hauls, $\hat{T}_y^{(1)}$ represents the discarded weight estimate based on fish ticket information and whole haul sample data, and $\hat{T}_y^{(2)}$ represents the discarded weight estimate based on fish ticket information and basket sample data.

Suppose that a vessel fishes for a period of time and delivers retained catch to a processor, but none of the hauls taken during the fishing time period were sampled. The question is, can weights of species discarded, by the vessel, be estimated? Note that the estimate (1) of T_y, discarded species weight, is of the form

$$\hat{T}_y = b_1 T_{x_1} + \dots + b_k T_{x_k}. \qquad (5)$$

A possible method for estimating discards in this case would be to use the most recent data from sampled hauls from the vessel to estimate the coefficients $b_1, \dots, b_k$, and then apply (5) along with fish ticket information to get the estimates. Another possibility would be to use current data from other vessels which are physically and operationally similar to estimate the coefficients $b_1, \dots, b_k$.

The following are some procedural requirements needed to make this proposed technique for estimating discards viable:

1. Each fish ticket issued to the vessels in this category needs to be matched with each of the observer samples taken from the hauls which led to issuance of the ticket.

2. Observer practices such as whole haul sampling a haul for prohibited species but basket sampling it for other species or basket sampling a haul for prohibited species and whole haul sampling it for other species must be discontinued. In other words, each haul sampled must be either whole haul sampled for all species or basket sampled for all species.

3. It may well be that some fishing vessels deliver retained catches of different species to different processors. For this case, the fish tickets issued by two or more processors to the same vessel for a common fishing effort must be matched with one another, as well as with observer samples taken from the hauls which led to issuance of the tickets.

4. Sometimes a vessel retains, for delivery to a processor, a portion of a certain species caught, and it discards the remainder. For example, a vessel may retain all pollock caught whose lengths are at least a certain length, and it may discard any pollock that are too small. For this situation, it will be necessary for the observer to determine beforehand, from the vessel operators, the characteristics which dictate which caught members of a species will be retained and which caught members will be discarded. The members of the species eligible

for retainment and the members eligible for discarding will need to be treated just as if they are separate species, when the species compositions of the samples from the hauls are determined. The weights of retainable portions of a species in the samples and the weights of the discardable portions of the species in the samples will need to be reported separately.

Procedural requirement #4 will enable us to obtain estimates of the weights discarded for species for which part of the catch is delivered for processing. Further, this requirement is necessary for making estimation of other discards as accurate as possible.

We will next consider the group of vessels which belong to category II, i.e. catcher-processors. Once again, the catch weights of discarded species will be estimated on a vessel by vessel basis.

We will assume that each catcher-processor periodically reports processed weights for the species it has caught and processed during the time that has elapsed since the last report. The processed weights will have to be converted to round weights by the use of product recovery rates. These round weight estimates are denoted by $\hat{T}_{x_1}, \ldots, \hat{T}_{x_k}$, if k of the species caught by a vessel are processed.

A procedural requirement will have to be imposed on catcher-processors. Processed weights reports will have to include the haul numbers for all of the hauls which have contributed to the product weights listed in the reports.

For any such processed weights report, some of the hauls whose numbers are listed will have samples taken from them by observers. As before, for the j-th sample, $j=1,\ldots,n$, x_{ij} represents the weight of the i-th processed species in the sample, for $i=1,\ldots,k$, and y_j represents the weight in the sample of any discarded species of interest. If T_y represents the discarded weight of this species by a catcher-processor, an estimate of T_y is

$$\hat{T}_y = w_1 r_1 \hat{T}_{x_1} + \ldots + w_k r_k \hat{T}_{x_k} , \qquad (6)$$

where the w_i's and the r_i's are given by (3) and (2), respectively.

Of the procedural requirements listed before for observers aboard category I vessels, those numbered 2 and 4 also apply to observers aboard the vessels which belong to category II. Further, if some of the hauls sampled by an observer are whole haul sampled, and others are basket sampled, the discarded weight estimate for any discarded species is given by (4).

For the category III group of fishing vessels, it is assumed that:

i. Each vessel in the group delivers, unsorted, each haul that it makes to a mothership.

ii. More than one catcher vessel may be delivering to a given mothership.

iii. The retained portions of the catches delivered to a mothership by more than one catcher are combined for processing.

iv. Hauls delivered to a mothership are numbered.

v. Some of the hauls delivered to a mothership are sampled by observers aboard the mothership.

vi. The catcher vessels which deliver to the same mothership are physically and operationally similar.

If these assumptions are true, catch weights of discarded species will be estimated for each group of catcher vessels which deliver to the same mothership.

We will assume here also that each mothership periodically reports processed weights for the species caught by its delivery vessels and processed by the mothership during the time that has elapsed since the last report. The processed weights will have to be converted to round weights estimates by use of product recovery rates. If for a given mothership report, k processed weights are listed, denote the associated round weight estimates by $\hat{T}_{x_1}, \ldots, \hat{T}_{x_k}$.

The same processed weights report requirement imposed on catcher-processors will have to be imposed on motherships. That is, processed weights reports will have to include the haul numbers of all of the hauls which have contributed to the product weights listed in the reports.

For any processed weights report, some, say n, of the hauls listed will have samples taken from them by observers. For the j-th sample, $j=1,\ldots,n$, x_{ij} represents the weight of the i-th processed species in the sample, for $i=1,\ldots,k$.

and y_j represents the weight in the sample of any discarded species of interest. If T_y represents the weight of this species caught in the hauls listed on a mothership's processed weights report, an estimate of T_y is given by (6).

Of the procedural requirements listed before for observers aboard category I type vessels, those numbered 2 and 4 also apply to observers aboard vessels which belong to category III. Further, if some of the hauls sampled by an observer on a mothership are whole haul sampled, and others are basket sampled, the discarded weight estimate for any discarded species is given by (4).

APPENDIX III

Analyses of ADF&G Shellfish Mandatory Observer Program

SUMMARY OF THE MANDATORY OBSERVER PROGRAM

Report of September, 1990 to:
The North Pacific Fisheries Management Council

By:

Dana Schmidt, Earl Krygier, and Peggy Murphy

Regional Information Report[1] 4K90-30

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, Alaska 99615

September 1990

[1]The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished division reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

MANDATORY SHELLFISH OBSERVER PROGRAM

I. Introduction

In April 1988, the Alaska Board of Fisheries adopted regulations requiring onboard observers for all vessels that process king crab and C. bairdi Tanner crab in the waters off Alaska. In 1990, this was expanded to include C. opilio Tanner crab. The Mandatory Observer Program was adopted after the Board received staff reports which indicated large discrepancies between catcher only vessels and catcher/processors and concluded that the only way that the catches could differ this greatly would be due to the processing of sublegal crab by the catcher/processor. Because of the significant variability of the data within the two types of vessels, it can not be inferred from pounds landed or pounds landed per pot lift or number of registered pots, that an individual vessel was fishing illegally. However, when these two types of vessels are examined in aggregate, we cannot envision any variable affecting fishing efficiency, that could account for the differences observed, other than lack of sorting of sub-legal crabs. The approximate 60,000 lb average difference between the catcher/processor and catcher only vessel would have a total ex-vessel of $5,000,000 at the average prices received during the 1987 Bering Sea red king crab fishery. Minimum crab size limit is generally enforced by measurement of crabs at the delivery sites. However, catcher/processors discard carapaces when crab are sectioned and processed. Observers, recording the size structure of the catch, functionally enforce minimum size limits. The Board also agreed that the observer program would be the only means of obtaining much needed biological information from the shellfish fisheries. The cost of the program is borne by industry, and utilizes third party contractors.

The department developed guidelines and certification requirements for both observers and contractors, provided training and data collection standards and forms, tested observers and provided briefings and debriefings before and after the at sea observations occurred. Daily reports were required from all observers during short duration king crab fisheries with weekly reporting during the longer duration fisheries. Observers report in code, the number of legal males, pots pulled, sampling conditions and in certain cases, statistical areas fished during the previous 24 hour period or week.

After two seasons of observer coverage, ADF&G staff and the public presented a laundry list to the Board of Fisheries connoting real and perceived short comings of the onboard observer program. With the aid of an Ad Hoc committee of industry, ADF&G staff, legal council, and Board of Fish members, the Board adopted a number of changes to the state's shellfish onboard observer program. These included:

1. A strict interpretation of conflict of interest with respect to co-investment and degree of Kindred was set for both observers and contractors

2. Requirements for observer educational and work experience were defined

3. Observer duties and responsibilities were more clearly defined

4. The "opilio" Tanner crab fishery was required to support onboard observers. These actions were taken to alleviate perceived short comings in our existing

program, which addresses both conservation, management, and enforcement objectives.

II. Specific problems raised by the industry

The letter presented to the Council under Tab D-2 at the June Council meeting, regarding the crab observer program, from NPFVOA, American High Seas, Midwater Trawl Coop, AFTA, Alaska Groundfish Data Bank, and the Highliners Assoc., presented a number of issues regarding the State of Alaska's crab observer program. The issues raised would certainly have had relevance prior to the March Board of Fisheries meeting when crab issues were addressed. But considering the actions taken by the Board to realign the crab observer program, and the inclusion of industry - particularly some of the signatories of this letter - in developing those changes, we believe the issues raised to be no longer pertinent. The following provides a summary response to the major points raised.

1. They do assert that the observer coverage is not adequate.

   The Department believes that the actions of the Board of Fisheries has addressed this question. While it is correct that the state does not have observers on catcher vessels, there is a catch delivery sampling program to cover catcher vessels. Sample size for the dockside program and onboard observer program are more than adequate to obtain accurate assessment of quantity and quality of landed product. For the at sea sampling program, the number of vessels and the number of pots examined appears to provide adequate precision for the long duration fisheries for bycatch samples. There is no information which would indicate that the observed fleet is fishing in areas different, or more effectively, than the unobserved fleet. ADF&G scientists believe that the present monitoring system adequately samples the whole crab fleet. Variation in gear type among vessels is relatively minor and certainly not dependent upon whether product is processed at sea. This letter calls for an additional observer program, at considerable expense, for determination of bycatch rates that have not been recognized as a serious problem, except for other shellfish species. The data available from the current observer program has been used to modify regulations to reduce this problem at the previous meeting of the Alaska Board of Fisheries.

2. It was suggested that we don't collect or use biological/fishery information.

   In fact, the State of Alaska uses the information which it collects in both the onboard and shore side observer program to manage the fishery in-season and out of season; often relying on daily reports to manage. Just as NMFS uses <u>its groundfish data</u> collection information to open and close the fisheries, project closures, and suggest management measures to the Council, ADF&G uses its in-season crab data collection information to similarly manage the crab fishery. The Board of Fisheries has mandated that this program be used to both enforce regulations and collect management information. As an example, the information collected from this program was presented to the Board of Fisheries who,with this justification, adjusted crab seasons and gear to reduce bycatch of soft shell, juvenile, and female crab in the crab fishery. Four published informational reports have been compiled using ADF&G observer data. In addition to existing staff, ADF&G has recently established and hired three positions to help further administer and compile information from the observer program. Observer information and samples can greatly help understand the dynamics of the crab resources and fisheries. Analysis of bycatch composition and rates will further aid the Board of Fisheries in structuring the crab fisheries.

3. The letter also raises the concern that the program is poorly designed and executed; particularly in respect to observer qualifications.

   We note that the NMFS groundfish observer program is modelled, in part, after our state program which uses third party contractors. ADF&G's original specifications for observers were those listed under NMFS's foreign observer program. They were modified under the urging of industry. What this letter doesn't mention, is that the Board of Fisheries - in their March meeting, restructured the state program to rectify the shortcomings mentioned. In fact, our program now goes beyond the federal observer program in some ways. We are particularly concerned that they not only request that catcher vessels be under the NMFS observer program, but that catch/processor vessels also be allowed to have NMFS observers instead of ADF&G observers. Since both agency programs draw from the third party observer supply companies, the difference would only be in a lessening of third party contractor standards. Under the state program, some observer supply companies, unless restructured, are likely to be decertified and no longer partake in the State observer program. Decertification will result from both implied and reported infractions in conflict of interest. Because of potential illegal landing of small crab creating major financial incentives for the hiring of "friendly observers", contractors who have any other business dealings with the crab industry have been considered to be in conflict.

Even though this crab fishery is managed under a crab FMP, actual management is deferred to the state. The state uses its program to manage the crab fishery in-season. Bringing in a federal program on top of the state program will cause confusion and may disrupt the state's ability to manage this fishery. If additional changes are required to the state's program, these could, and should, be accommodated through the Board of Fisheries process. This would be much more cost effective and efficient than administratively conducting two programs.

What may be the real concern of the authors, is that the costs of the program are not born equitably between the catcher vessels and the catcher/processors. Since this fishery is jointly managed under an FMP, we would hope that any changes to the Magnuson Act which would rectify the imbalance of those who pay for the observer coverage also include the state observer program so that all vessels share equitably in the cost of management.

III. Summary of observer data

The observer program and the ADF&G port sampling program have provided three types of information.

First, the mandatory shellfish observer program has procedures used to determine the legality of the landed and processed product. These procedures were recommended by the Department of Public Safety for use to insure the information collected can be used for enforcement of the sex and size specifications established for a particular crab fishery. Collection of this information has been a priority for short duration fisheries where potential landing of sub-legal crab is high, or in longer duration fisheries where enforcement of the size limit is recognized as a problem. A similar enforcement activity occurs by ADF&G and public safety employees during shore based examination of landings and by ADF&G staff aboard floating processors and occasionally aboard catcher or catcher processor vessels.

The second type of information collected by both at sea observers and ADF&G port samplers (on floating processors as well as shore based plants), involves collection of the shell size, age, and condition information from delivered product, as well as verifying accuracy of fish ticket data. Extensive sampling from all fisheries have resulted in a large percentage of the total landings being examined and measurements from thousands of landed crab. Some quality control problems with the observer data sets obtained have resulted in eliminating significant amounts of this information from the data base. Length frequency data from both programs are generally merged and reported in the spring Board of Fisheries report.

The third type of information is bycatch data from the pots being fished. The entire contents of a sub-sample of pots have been examined to determine what animals are being discarded. The primary emphasis has been on long duration fisheries during the period when crab are molting. Collection of groundfish data has occurred but with limited emphasis because of low catch rates. Sufficient data have been obtained for public release for the 1988-1989 Adak Brown crab fisheries and the 1989 Tanner crab fisheries. These are summarized in the attached table and have been previously been made available to industry. The high bycatch rates of red king crab in the C. bairdi fishery were a major factor in adoption of a March 31st closure date of this fishery, the onset of the molting period of red king crab. Additional regulations were adopted to address sorting by increasing panel sizes in crab pots.

Daily catch reports from both catcher vessels and catcher-processor vessels are also used in season for projection of closure dates when a quota is to be reached and to obtain in-season catch per unit effort data to use for stock abundance analysis. Cooperation of vessels with and without observers has been high, with accurate information generally being transferred. Non-reporting of vessels has decreased with observers presence however.

Improvements planned for the groundfish bycatch data for the upcoming year include additional data collection (length measurements) with supplemental species identification training. These procedures should insure accurate estimates of total weight caught. Improved training by use of live crab should also help in identifying shell age and condition, a shortcoming observed in much of the observer data obtained to date. Assistance in tag recovery programs are also anticipated to be a contribution the observers will make this coming year.

When enforcement concerns are being met by the observer program, the collection of bycatch data increases. As these data require much more diligence and training to complete properly, improved observer standards and experience should improve the amount of useable data obtained. Industry suggestions for improvement are always welcome and have been lively topics at the Board of Fisheries meetings.

Summary of Bering Sea Bycatch Data in Directed Crab Fisheries

Incidental catch rate, number of animals per metric ton of landed crab and number of animals per landed crab, in observed crab fisheries, Sept. 1988 thru August 1989. Three fisheries, Dutch Harbor brown crab in 1988 and Bristol Bay red crab in 1988 and 1989, had too few vessels observed to release data.

	Bering Sea Eastern District C. bairdi 1989						Adak Brown King Nov 1, 1988 thru Aug 15, 1989					
	----No./mt----			----No./Crab-----			-----No./mt-----			----No/Crab----		
	Mean[1]	Min[2]	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Tanner[3]												
Legal	-----------Target Species-------						2.7	0[4]	251	0.005	0.000	0.490
Sublegal	1391.8	279	1979	1.515	0.303	2.155	17.9	0	879	0.035	0.000	1.714
Female	178.6	14	265	0.194	0.015	0.289	10.6	0	565	0.021	0.000	1.103
Total	1570.4	292	2245	1.710	0.318	2.444	31.2	0	1695	0.061	0.000	3.307
King[5]												
Legal	245.6	0	780	0.267	0.000	0.849	---------Target Species-----------					
Sublegal	502.2	0	1381	0.547	0.000	1.504	534.8	171	2066	1.043	0.333	4.029
Female	250.9	0	834	0.273	0.000	0.907	609.4	231	2323	1.189	0.451	4.531
Total	998.8	0	2995	1.087	0.000	3.261	1144.2	402	4389	2.232	0.784	8.560
Cod	112.4	14	187	0.122	0.015	0.204	44.4	6	820	0.087	0.012	4.531
Halibut	1.0	0	19	0.001	0.000	0.021	4.1	0	18	0.008	0.000	0.034
No. Pots			1322							1385		
No. vessels			7							13		

Mortality Rate Estimate

	Bering Sea Eastern District C. bairdi	Adak Brown King
Fishery lbs	6,948,201	8,957,945
Deadloss lbs[6]	34,664	122,251
Deadloss/Mort. Rate	0.5%	1.4%

1 The Mean is the fishery average.
2 The Min and Max are the extreme individual vessel rates.
3 Incidental catch of Tanner crab in the brown king crab fishery was predominantly C. bairdi.
4 0 and 0.000 indicate no catch.
5 Incidental catch of king crab in the C. bairdi crab fishery was predominantly red king crab.
6 The fishery deadloss is used as an estimate of incidental catch mortality.

IV. Evaluation of adequacy of coverage.

To address industries concerns on the adequacy of coverage of the existing shellfish observer program, we must look at the observer program combined with existing ADF&G staff and other sources of data used at addressing management questions. The major information needs for management of fisheries are as follows:

1. Stock abundance and composition

This information is generally obtained through independent trawl and pot surveys. In the Bering Sea, NMFS, and most recently ADF&G have conducted such efforts. Pot research surveys provide information on bycatch problems that may be experienced in the fishery as well as other information on abundance and condition of the target species. In stocks not surveyed, only the harvest rates obtained from landings data and the composition of the catch is available. The recent observer data from catcher processors in the Adak Brown crab fishery has provided some information useful in determining recruitment trends and crab condition, previously not available. Groundfish bycatch data are also available. Observer recovery of tags in the future may be highly useful in determining abundance of commercially sized crab plus providing additional information on crab size, shell age of tagged crab recovered in the fishery. Recovery rates may also provide data on mortality of crab. In general, these data are best obtained by independent surveys and are not dependent upon observer coverage.

2. Verification of catch numbers and rates, catch size and age composition, and molting problems.

These data are obtained from both ADF&G port samplers and mandatory observers. Coverage has been extensive in all of the fisheries managed by ADF&G and large samples are available, both in terms of numbers of crab examined as well as percentage of the vessels. Prior to the observer program, catcher processors had such difference in catch per unit effort, in season data analysis would require separation of these data from shore or floater based deliveries for accurate projections of the harvest so closure dates could be set. These data are generally similar when soak time or other variables are accounted for among the two components of the fleet. Problems are related to individual vessels and observers and not components of the fleet in general. The Bering sea red king crab fishery was examined in 1987 for time and area affects on the distribution of catch rates among the catcher vessels and the catcher processors. Despite major differences in catch rates between the vessel types, differences in area fished when examined by statistical area could not be discerned. Small numbers of vessels of either type limited this type of comparison however.

3. Estimation of bycatch rates in directed crab fisheries.

Bycatch rates can only be established by on-board observers. Pot surveys provide some insight into problem areas but still leave unresolved the general problems occurred by the fleet in general. The mandatory observer program has provided our first opportunity to obtain this type of data. Coverage is dependent upon the percentage of the fleet composed of catcher-processor vessels. Fisheries included under the Bering Sea Crab FMP have generally a higher percentage of catcher-processors participating as the total poundage decreases. Thus although numbers of vessels included with observer drops, the percentage of total landings increases. The additional table below provides a summary of statistical areas that have had at least a single delivery in a given month from both catcher-processors (observed) versus catcher vessels for major recent Bering Sea red king crab fisheries. Note that the fishery with the smallest percentage of the catch coming from statistical areas without both catcher processor and catcher vessel landings recorded is the Adak Brown crab fishery. Small numbers of vessels and a protracted season over a large geographical area are contributing factors. During the time period presented, approximately 50% of the catch came from catcher processors with on-board observers.

Summary Table of Bering Sea Crab Fisheries Time and Area Landings Data

Bristol Bay Red King Crab Fishery

	Catcher-Processor and Catcher Landings (Bycatch Observed) (18% Total Catch)*		Catcher only Landings (Bycatch Not Observ.) (72% Total Catch)**	
Time Frame	Monthly	Entire Fishery	Monthly	Entire Fishery
Stat. Areas (29 Total)	16	--	13	--
% of Total Catch	96%	--	4%	--

Bering Sea C. Bairdi Tanner Crab

	Catcher-Processor and Catcher Landings (Bycatch Observed) (8% Total Catch)*		Catcher only Landings (Bycatch Not Observ.) (82% Total Catch)**	
Time Frame	Monthly	Entire Fishery	Monthly	Entire Fishery
Stat. Areas (44 Total)	10	4	21	9
% of Total Catch	71%	9%	16%	4%

Adak Red King Crab

	Catcher-Processor and Catcher Landings (Bycatch Observed) (37 % Total Catch)*		Catcher only Landings (Bycatch Not Observ.) (63 % Total Catch)**	
Time Frame	Monthly	Entire Fishery	Monthly	Entire Fishery
Stat. Areas (33 Total)	3	--	26	4
% of Total Catch	59%	--	31%	10%

Adak Brown King Crab

	Catcher-Processor and Catcher Landings (Bycatch Observed) (50% Total Catch)*		Catcher only Landings (Bycatch Not Observ.) (50% Total Catch)**	
Time Frame	Monthly	Entire Fishery	Monthly	Entire Fishery
Stat. Areas (80 Total)	10	22	33	15
% of Total Catch	33%	40%	10%	17%

* Potential percentage of total weight of landings where bycatch may be examined by observers.

** Potential percentage of total weight of landings where bycatch cannot be observed with existing program.

Summary

Of the three types of data collected in crab fisheries the first two have essentially equal information being collected from both catcher and catcher processor vessels by the combination of port samplers and mandatory observers. Observer quality control is the primar, problem but recent Board of Fisheries actions have provided some remedies. Only the bycatch data collection is limited to catcher-processors only, although the Department has placed limited staff aboard catcher only vessels on occasion. The prevalence of catcher processor's in Bering Sea fisheries have provided sufficient opportunity to collect adequate data where the Department of Fish and Game, following Board of Fisheries general guidelines, has found bycatch data collection to be a priority. As observer quality improves, and a general acceptance of catcher processor vessel crews of keeping landings legal, the amount of data will increase. Examination of time and area data from landings reports does not suggest that catcher processor differ in their fishing patterns to suggest any major bias in using data from catcher-processor only vessels in assessing bycatch.

If a funding mechanism develops in the future for providing for observer coverage by assessing a fee from the fleet, observer's could be placed on all types of vessels. The inherent problems with enforcement of size and sex prohibition on at sea processors will continue and will probably insure 100% observer coverage requirements for at sea processors in the future.

A COMPARISON OF CATCHER-PROCESSOR VESSEL AND CATCHER VESSEL FISHING PERFORMANCE IN THE 1988 BERING SEA RED KING CRAB FISHERY

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Abstract

The Bering Sea red king crab population is fished by a fleet whose composition contains a significant number of catcher-processor vessels in operation. During the 1988 fishery, on-board observers were placed on these vessels, for the first time. We have examined the catch per unit effort (CPUE) for catcher vessels and catcher-processor vessels operating in the Bering Sea. In the 1988 fishery, the average pounds landed per catcher vessel was approximately 36,000 compared with an average of approximately 50,000 for the catcher-processor vessels. The landing rate was 51 pounds per pot-lift versus 48 pounds per pot-lift respectively. In 1988, the pounds landed per pot-lift, and pounds landed per number of registered pots of catcher-processor vessels were not significantly larger than the catcher vessels but were highly significant in 1987. Therefore we conclude that the observer program which was instituted in the 1988 fishery had a high likelihood of being responsible for the similarity in the catch per unit effort reported by the catcher fleet and the catcher-processor fleet.

Introduction

This report is a continuation of the previous examination of the differences in catch rates observed between catcher-processor vessels and catcher vessels participating in the Bristol Bay red king crab fishery. The previous report, hereafter referred to as the 1987 Report[2], addressed differences in the 1987 fishery observed before implementation of a mandatory on-board observer program by the Alaska Board of Fisheries in the spring of 1988. The Bristol Bay red king crab fishery was the first implementation of this observer program. The differences in catch rates reported in the 1987 Report was one of the factors considered by the Board of Fisheries in establishing the mandatory observer program. This report addresses the catch rates observed between the catcher-processor fleet and the catcher fleet during the 1988 fishery and compares these results with the 1987 Report.

The increased numbers of catcher-processor vessels that participated in recent Bering Sea red king crab fisheries stabilized in 1988 with 20 participating catcher-processor vessels as compared with 21 in 1987. A combination of the observer requirement, and the decreased guideline harvest level were probable contributors to this stabilization. Some vessels, capable of processing at sea, elected to operate as catcher only vessels, or process crab near shore-based facilities which exempted these vessels from the mandatory observer requirement. There has been an overall increase of 11 catcher-processor vessels since 1986.

This report examines apparent differences in catch rates between the catcher-processor vessels and catcher vessels in the 1988 fishery. As processing of sub-legal crab by catcher-processor vessels is not a probable explanation of any differences in the pounds landed during the 1988 fishery, such differences, if they exist, are most likely explained by other factors. Because of the small number of landings in each statistical area, and the inconclusive results obtained from examination of area of landings in the 1987 Report, we have excluded this variable from the analysis. The vessel size, the number of pots registered, and the number of pots lifted are examined in this report, similar to the 1987 Report. Because of the short duration of the 1988 fishery (7-days), most of the vessels made a single delivery. When more than one delivery was made, the pots were continually soaked. Because of these factors, differences in actual days fished were considered insignificant and are accounted for by the reported number of pot-lifts. The number of pots registered was considered to be somewhat imprecise, but there is no apparent reason for a catcher vessel to misreport number of pots registered differently than a catcher-processor vessel. The use of numbers of pots registered provides an alternative method of examining the effective amount of effort of a given vessel. Catch per unit effort was projected by using the reported number of pot-lifts and the number of pots registered as the effort.

Therefore, the objective of this analysis is to determine if the pounds landed and the catch per unit effort (CPUE) were significantly different for the catcher-processor vessels in the 7-day fishery held during September 1988 and to determine if on-board observers had an

[2]Schmidt, D. and B. A. Johnson. 1988. A Comparison of Catcher-Processor and Catcher Vessel Fishing Performance in the 1987 Bering Sea Red King Crab Fishery. Regional Information Report No. 4K88-14. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

impact. If such differences occurred, we examined if these differences can be explained by known differences between the two types of vessels. We will also examine the economic implications of the 1988 catch rates as compared to the 1987 catch rates.

Methods

The methods used are the same as those reported in the 1987 Report. We have excluded examination of the areal differences because of the small number of landings which occurred in each statistical area by catcher-processor vessels. This makes comparisons between the two types of vessels with respect to area fished, of limited value. The data used in this analysis were obtained from the fish tickets, the list of vessel type, and vessel registration forms. For catcher-processor vessels, a single fish ticket was usually submitted for the entire season, although on longer fisheries, a fish ticket is completed weekly. For catcher vessels, a ticket is completed at each landing. The basic data from the fish tickets consisted of pounds landed, number of crab landed, and number of pot-lifts. The basic data from the vessel registration forms consisted of numbers of pots registered and length of vessel. The data resolution is that of vessel, i.e. multiple fish tickets were combined for a single vessel.

To check for outliers in catch per unit effort or pounds landed, graphical methods of analysis were used. For testing differences in means we used the t-test for two independent samples (Snedecor and Cochran 1967) and the non-parametric test for the same, known as the Mann-Whitney or Wilcoxon rank sum test (Conover 1980).

In addition to the t-test and rank sum test to test for differences in the means of the two vessel types, a graphical method was used to locate differences in the sampling distributions of these data. The analysis of distributional differences was necessary because we could easily have had a segment of the catcher-processor fleet that landed crab at normal or sub-normal rates, while another segment of the catcher-processor fleet that experienced very high landing rates. Differences in means may be very minor in this case, but distributional differences could be very large.

We chose to use a graphical method to illustrate the distributional differences. The quantile-quantile plot or Q-Q plot (Chambers et al. 1983, Hoaglin et al. 1983, and Gnanadesikan 1977) can be used to determine if a sample distribution is similar to some other distribution. In addition to differences in the mean, other similarities or dissimilarities are observable.

Results

Graphical techniques were used to identify patterns in average crab weight, catch per unit effort, and other variables. From these patterns we identified outliers and errors in the data. By checking for outliers, one vessel was removed from the analysis because the average weight of the catch for that vessel was extremely low and not within the range of the other 198 vessels (Appendix A). The vessel also was the smallest vessel with the smallest catch. The average weight of the crab reported appeared to be below that expected for legal crab, suggesting possible errors in either the weight or the number of crab reported.

The difference in means was measured by use of a t-test. With this test, we determined if two average numbers were different and if different, we assigned a probability to the significance of that difference. The first theoretical problem encountered was the normality assumption for the t-test. This assumption did not always hold. The Wilcoxon test is robust under violation of this assumption and was used as an alternative for comparison. For pounds landed, the square root transformation did result in normalized data. The other variables in this study showed similar results after transformation by either natural logarithm or square root transformations. Before each test a normality plot was obtained for the transformed and untransformed variables to determine the appropriate transformation.

Comparisons of Pounds Landed and CPUE for 1988

All mean values for each variable except the pounds per pot-lift and pounds per pot registered were significantly greater for the catcher-processor vessels as indicated by the test statistics (Table 1). This differs from the 1987 fishery data, in that the mean values for all variables were significantly greater for the catcher-processor vessels in 1987.

Table 1.—Test statistics for difference in mean values between catcher-processor vessel (N=20) and catcher vessel (N=178) (t-test was applied to the appropriate square root or natural log transformed data).

Variable	Mean values: Catcher vessel	Mean values: Catcher-processor vessel	Ratio of means	P-value: Wilcoxon test	P-value: t-test
Pounds landed	35766	49727	1.39	0.002	0.004
Number of pot-lifts	705	1039	1.47	<0.001	<0.001
Pounds per pot-lift	50.7	47.9	0.94	0.388	0.483
Number of pots registered	237	376	1.59	<0.001	<0.001
Pounds per pots registered	145.7	134.7	0.92	0.444	0.360
Vessel length (ft)	101	153	1.51	<0.001	<0.001

The P-values for the two statistical tests indicate the probability of differences in means between the catcher vessels and catcher-processor vessels being caused solely due to chance. The 0.002 value, for example, indicates that there is less than 2 chances in 1000 that the 13,961 pound difference between the mean values 35,766 and 49,727 pounds landed is not significantly different from zero.

To illustrate the difference in the distribution of pounds landed, the catcher-processor values (dots) were compared to the catcher vessel distribution (solid line) in the Q-Q plot in Figure 1. If the catcher-processor distribution was the same as the catcher vessel distribution, the dots would occur randomly around the solid line.

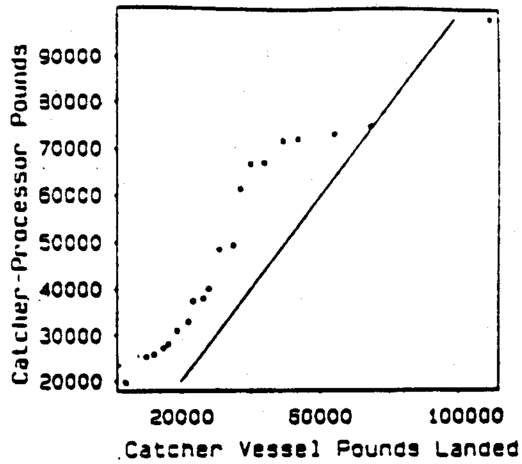

Figure 1. Catcher-processor pounds landed compared to catcher vessel distribution.

Notice that in Figure 1 all but two of the points of the catcher-processor vessels are above the solid line. Each dot represents a catcher-processor vessel. The y-axis shows the actual pounds landed and the x-axis shows the pounds landed by an equivalent catcher vessel. Over the period of the fishery, the majority of the catcher-processor vessels consistently had greater pounds landed than the catcher vessels. The vertical difference from the solid line to each dot reflects the difference in pounds between an equivalent catcher-processor vessel and catcher vessel.

Although the difference in average pounds landed between the two vessel types is significant ($P<0.01$), the pounds landed may be affected by the number of pot-lifts or the size of vessel. As an alternative measure of effort, registered number of pots was also used as a comparative basis. For both measures of CPUE, the catcher-processor vessels did not have significantly different values when compared to the catcher vessels (Table 1).

Because catcher-processor vessels are much larger vessels, on average, than the catcher vessels, we further examined the data to determine if length of vessel would explain the differences observed. To provide similar size classes of both catcher-processor and catcher vessels, vessels of 130–170 feet were selected. In addition, this size group allows a comparison with the 1987 Report. This group included 12 catcher-processor vessels and 23 catcher vessels. As in the 1987 Report, the pounds landed were not dependent upon vessel length (Figure 2). This grouping provided sufficient numbers of vessels and low significant difference of length ($P=0.09$) (Table 2).

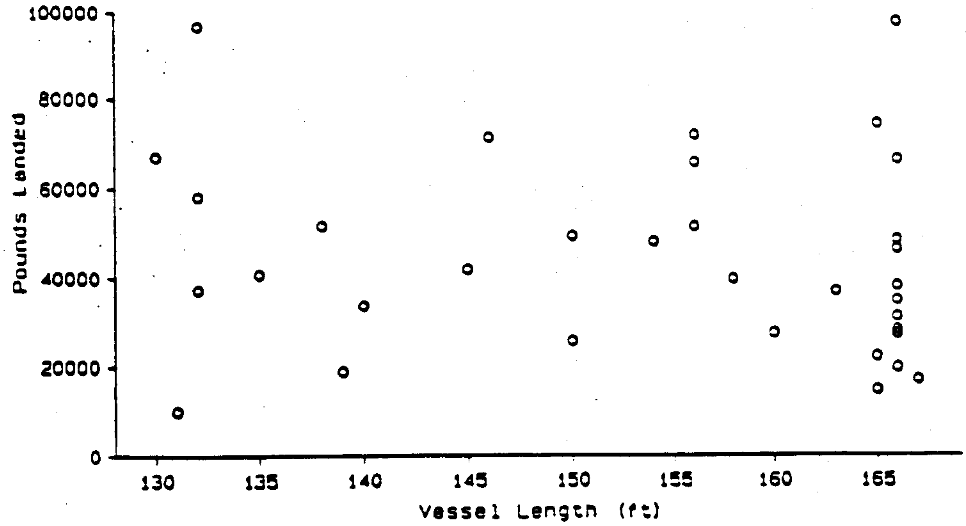

Figure 2. Scatter plot of pounds landed versus vessel length (N=35).

Table 2.—Test statistics for difference in mean values between catcher-processor vessel (N=12) and catcher vessel (N=23) with length between 130 ft and 170 ft (t-test was applied to the appropriate square root or natural log transformed data).

	Mean values			P-value	
Variable	Catcher vessel	Catcher-processor vessel	Ratio of means	Wilcoxon test	t-test
Pounds landed	40131	53817	1.34	0.060	0.048
Number of pot-lifts	795	1043	1.31	0.004	0.003
Pounds per pot-lift	54.4	50.9	0.94	0.473	0.391
Number of pots registered	316	410	1.30	<0.001	<0.001
Pounds per pots registered	126.9	132.4	1.04	0.327	0.407
Vessel length (ft)	151	158	1.05	0.090	0.090

For vessels of size 130–170 feet in length, there is still a statistical difference between mean pounds landed, however it is not highly significant ($P=0.06$). Neither measure of CPUE shows a statistical difference between catcher-processor vessels and catcher vessels (Table 2). The number of pot-lifts is still significantly greater for the catcher-processor vessels.

Comparisons of 1987 and 1988 Fisheries

We have analyzed the 1988 Bering Sea red king crab fish ticket data in an attempt to determine if a disparity existed in pounds landed between the catcher vessels and the catcher-processor vessels. If a disparity exists, it is unlikely to be caused by illegal catch because all catcher-processor vessels had observers on-board during the 1988 fishery. There was a significantly larger average catch for the catcher-processor vessels in the 1988 fishery (Table

1). However, the CPUE was not significantly different when considering pounds per number of pot-lifts or pounds per number of pots registered. This combined with a significantly greater number of pot-lifts for the catcher-processor vessels would explain the larger catch. The comparative values were different from those observed during the 1987 fishery. The comparison is best presented graphically and by comparing the 1987 and 1988 pounds landed, the difference between the catcher-processor vessels and catcher vessels within year and between years is quite evident (Figure 3).

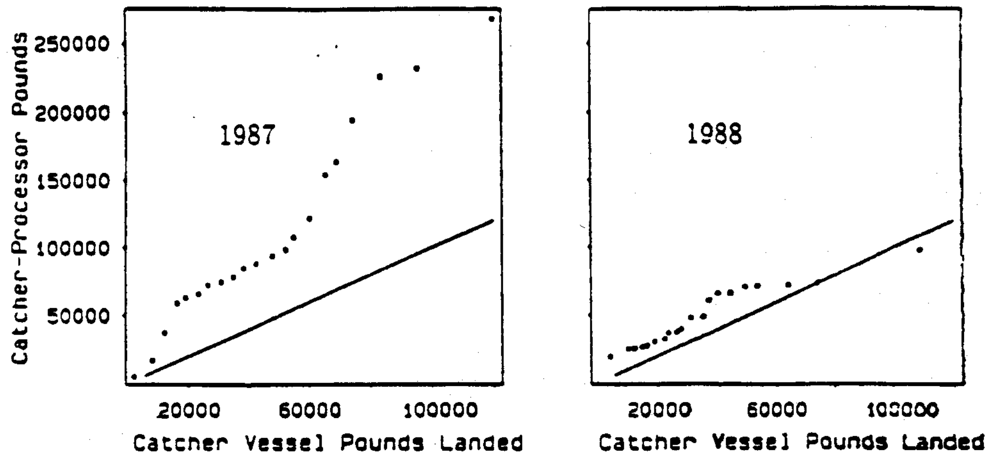

Figure 3. Comparison of 1987 and 1988 catcher-processor pounds landed compared to catcher vessel distribution.

The 1988 data in Figure 3 is repeated from Figure 1 with a scale adjustment to provide a visual comparison with the 1987 data. In Figure 3, each dot represents a catcher-processor vessel. The y-axis lists the pounds landed by the catcher-processor vessels and the x-axis represents the pounds landed of an equivalent catcher vessel. By comparing all of the dots relative to the solid line, the 1988 distribution of pounds landed for the catcher-processor vessels is essentially parallel to the catcher vessel line and illustrates that the catcher-processor vessels had an overall larger catch, but the distributions have a variability much more similar than during 1987. The closeness of the points to the line in 1988 versus 1987 illustrates that the distribution of pounds landed in 1988 by the catcher-processor vessels is much more similar to the catcher vessels than during the 1987 fishery. The average difference in pounds landed for the catcher and catcher-processor vessels was approximately 14,000 in 1988 versus 63,000 in 1987.

Pounds per pot-lifts in 1987 was significantly greater for catcher-processor vessels, but not during the 1988 fishery. The comparison between the two years is shown in Figure 4.

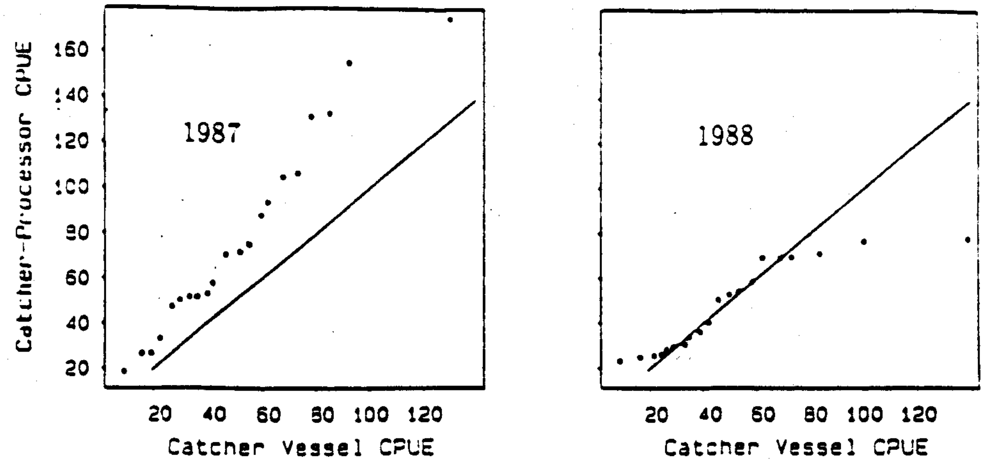

Figure 4. Comparison of 1987 and 1988 catcher-processor pounds landed per pot-lift compared to catcher vessel distribution.

In Figure 4, each dot again represents a catcher-processor vessel. The y-axis lists the CPUE of the catcher-processor vessels and the x-axis represents the CPUE of an equivalent catcher vessel. By comparing all of the dots relative to the solid line, CPUE for the catcher-processor vessels are essentially the same as the catcher vessels, in 1988. The several data points on the upper tail of the distribution fall below the line but do not alter the conclusion that these distributions are similar.

Although the lack of statistical difference in the mean CPUE for vessels of all sizes is a logical stopping point, we also present a comparison of the 1987 and the 1988 data for vessels 130 ft to 170 ft. The same patterns hold as with the vessels of all sizes and can be illustrated in the same manner through Q-Q plots. The distribution of pounds landed per catcher-processor vessel in 1988 shows less variation than in 1987 and is more similar to the catcher vessels (Figure 5). The CPUE for catcher-processor vessels in 1988 is essentially the same as catcher vessels; differing from the illustrated distribution in 1987 (Figure 6).

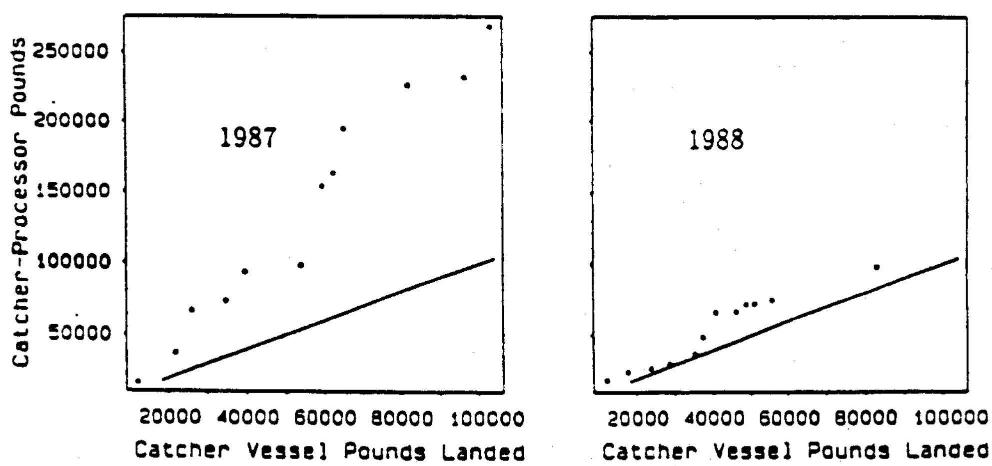

Figure 5. Comparison of 1987 and 1988 catcher-processor pounds landed compared to catcher vessel distribution (vessels 130–170 ft).

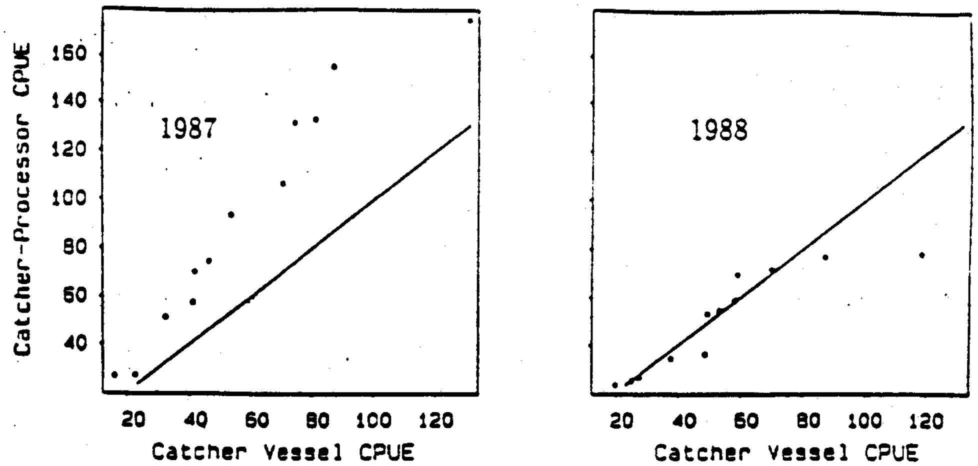

Figure 6. Comparison of 1987 and 1988 catcher-processor pounds landed per pot-lift compared to catcher vessel distribution (vessels 130–170 ft).

Table 3 tabulates the differences in the catch values between 1987 and 1988 for both vessel types between 130 and 170 ft in keel length. The pounds landed by the catcher-processor vessels in 1988 were approximately 1.3 times higher than the catcher vessels, when considering vessels of similar length. This compares with 2.5 times higher in 1987. It is a safe assumption that the pounds landed are relatively free from reporting errors. When comparing the vessels in total, the catcher-processor vessels had landings that were 1.4 times larger that of the catcher vessels in 1988 versus 2.3 times larger in 1987.

Table 3.—1987 and 1988 mean values for catcher-processor vessel and catcher vessel with length between 130 ft and 170 ft.

Variable	Catcher vessels 1987	Catcher vessels 1988	Catcher-processor vessels 1987	Catcher-processor vessels 1988	Ratio of means 1987	Ratio of means 1988
Pounds landed	54844	40131	136074	53817	2.48	1.34
Number of pot-lifts	1013	795	1396	1043	1.37	1.31
Pounds per pot-lift	58.5	54.4	92.4	50.9	1.58	0.94
Number of pots registered	300	316	398	410	1.32	1.30
Pounds per pots registered	183.0	126.9	330.3	132.4	1.80	1.04
Vessel length (ft)	152	151	155	158	1.01	1.05

The average number of pot-lifts as reported on the fish tickets was significantly larger for the catcher-processor vessels, for vessels of all lengths, and when only vessels of similar size were compared. The number of pot-lifts of the catcher-processor vessels relative to the catcher vessels in 1988 (1.31) is very similar to the same ratio for 1987 (1.37) (Table 3).

Discussion

Analysis of vessels of all lengths indicates that catcher-processor vessels had average pounds landed per pot-lift essentially identical to that of an average catcher vessel. When the vessels compared were vessels of similar keel lengths, average pounds landed per pot-lift by catcher-processor vessels was again not significantly different than that reported by the catcher vessels.

Differences in pounds per vessel and pot-lifts per vessel were significantly higher in 1988 for catcher-processor vessels when compared to either similar sized catcher only vessels or all catcher only vessels. As this difference is confirmed by observers, and the larger number of pots registered also reflects this difference, apparently processing vessels in this size range can fish more pots and also pull significantly more pots. Larger crews and possibly more deck space may be an explanation.

The difference in average catches between catcher-processor vessels and catcher vessels can be explained by the difference in the number of pot-lifts. No significant differences between these vessel types remains, once this variable is taken into account.

From the previous discussion, it appears that parity in the fleet has been obtained by the presence of mandatory observers on the catcher-processor vessels. The economic advantage, beyond the processing capabilities, is now explainable by an increased number of pots fished and an increased number of pots lifted.

In addition, the relative number of pots lifted by catcher-processor vessels compared with catcher only vessels in 1988 and 1987 was similar. This would indicate that the on-board observers did not reduce the fishing efficiency of the catcher-processor vessels.

The economic impact of the observer program can be estimated by some simple comparisons. The average price per pound for the red king crab fishery was estimated at $5.10. If we assume the differential pounds landed per vessel between the 1988 and 1987 red king crab fisheries was entirely due to the observer, the following approximate redistribution of ex-vessel product value can be projected for the 1988 Bristol Bay red king crab fishery if an observer were not present. This projection assumes that illegal landings of small crab are the total cause of the differences observed between 1987 and 1988 and the difference in catch rates observed in 1987 between catcher-processor vessels and catcher only vessels would have occurred in 1988. The estimates are based on the assumption that the fishery still would have closed when the 7.3 million pound total harvest of crab was reached.

Table 4.—Estimated economic impact of the on-board observer program during the 1988 fishery.

Vessel type	Actual pounds per vessel	Total pounds	Projected without an observer: Pounds per vessel	Projected without an observer: Total pounds	Projected change: Pounds	Projected change: Value per boat	Projected change: Total value
Catcher-Processor	49,727	994,546	76,599	1,531,985	537,439	$137,047	$2,740,939
Catcher	35,766	6,366,377	32,747	5,828,938	-535,000	-$15,399	-$2,740,939

The average values may be deceptive in that catcher-processor vessels which fished legally prior to having observers would actually, on average, experience a gain similar to the catcher vessels. If the difference is due solely to illegal landings, the vessels which had reduced catches because of observers, experienced major losses. These losses dwarf the actual cost of providing for an observer. The revenue increase to the legal catcher-processor vessels, because of extra fishing time, probably offsets more than the cost of the observer.

Conclusions

We examined the pounds landed as a function of the number of vessels, the number of pot-lifts, and the number of pots registered to determine if significant differences occurred. With an on-board observer the pounds landed for catcher-processor vessels was still significantly larger in 1988. However, the CPUE indicated that both types of vessels showed the same fishing efficiency. If this is a true measure of fleet fishing effectiveness, then the 1987 CPUE for catcher-processor vessels was unreasonably high. This would lead to the conclusion that illegal crab were taken during the 1987 fishery. To provide equal enforcement of size and sex regulations established for this fishery it is essential that a mandatory on-board observer program continue. The costs of continuing this program are very small when compared with the potential value of illegal crab taken by unobserved processing vessels.

Literature Cited

Chambers, J. M., W. S. Cleveland, B. Kleiner, and P. A. Tukey. 1983. Graphical methods for data analysis. Wadsworth, California.

Conover, W. J. 1980. Practical nonparametric statistics. John Wiley, New York.

Hoaglin, D. C., F. Mosteller, and J. W. Tukey. 1983. Understanding robust and exploratory data analysis. John Wiley, New York.

Gnanadesikan, R. 1977. Methods for statistical data analysis of multivariate observations. John Wiley, New York.

Snedecor, W. G. and G. W. Cochran. 1967. Statistical methods. Iowa State University Press, Ames, Iowa.

Appendix A

The first step in the analysis identified an anomaly in the observed data that indicated a catch of underweight crab that either indicated a wrong count in the number of crab or incorrect pounds landed. The amount of the landing was extremely small, and considering the short length of the vessel, we concluded that the vessel was not participating in the fishery in a similar manner as the remainder of the fleet. The extreme difference can be seen in Figures A1 and A2.

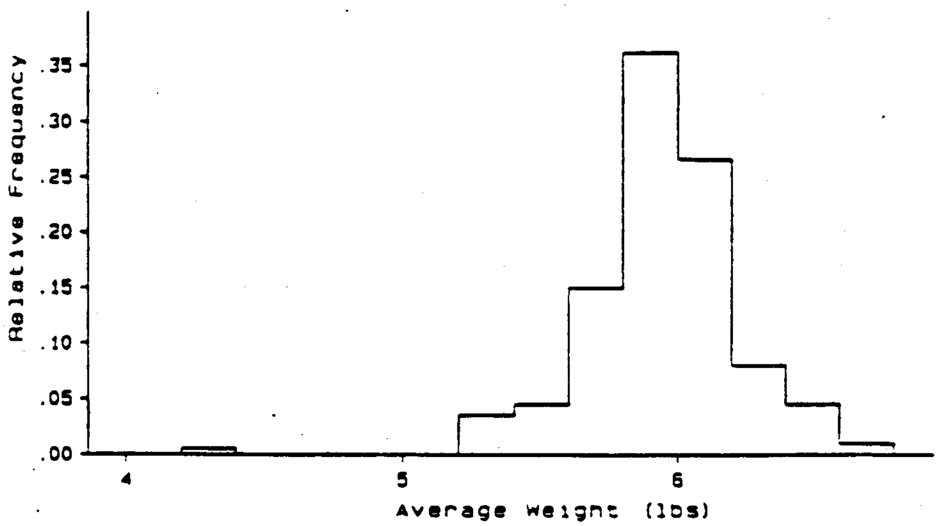

Figure A1. Distribution of average crab weights and identification of outlier.

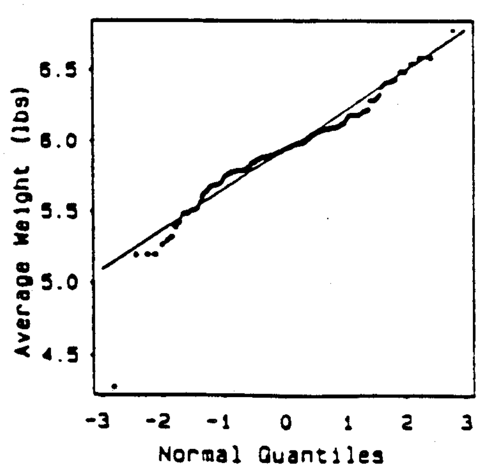

Figure A2. Normal plot of average crab weights and identification of outlier.

SPECIAL REPORT ON CATCHER PROCESSORS/OBSERVERS REPORTING

The 1988 Bristol Bay red king crab season produced a catch of 7.4 million pounds harvested by 200 fishing vessels with twenty catcher/processors. Making up only 10% of the fishing fleet, catcher/processors harvested 994,546 pounds, 13.5% of the season harvest, an average of 49,727 pounds per vessel compared to an average catch of 35,515 pounds for the catcher only vessels, (Table 1).

Observers were placed onboard all twenty catcher/processors. Observer reports on catches were received daily and, at the end of the season, this information was compared to that turned in by the operator of the catcher/processor on a fish ticket. Nine catcher/processors had significant differences in the number of crab reported on their fish ticket and that reported by the observer. These differences ranged from the vessel reporting 1,733 crab less than the observer to the observer reporting 1,150 more crab than the vessel. Although observers were asked to obtain independent counts of legal crab, during debriefing admitted that they obtained their counts from the operator as they were busy doing biological sampling.

Some of the differences in reporting can be attributed to a 12 hour period just before the closure that reports were not taken from the observers, although the accumulative catch should have reflected this catch. The main reason that the catches could vary significantly is that the catcher/processor vessels have no need to know how many legal crab they are catching, since crew shares, etc. are based on the finished product weight and not the number or live weight of crab.

Because of the discrepancies between the fish tickets and the observer reports, the Department requested from each catcher/processor additional information; i.e. 1) the total number of cases processed and shipped, 2) the average weight of each case, 3) the average number of crab in each case, 4) the recovery rate used by the vessel to calculate its poundage and 5) other information to assist in clarifying discrepancies. Responses were received from nineteen catcher/processors, one has not responded and one other has not provided all the information requested. This additional information, in most cases, generated a completely different figure from the reported fish ticket poundage, (Table 2). Some of these differences can be attributed to the lack of adequate information received from the vessels as to the average number of crab in a case and the recovery rate used to calculate the poundage.

As Table 2 shows, five vessels over reported 13,563 pounds and eight vessels under reported 25,396 pounds, with a net under reporting of 11,833 pounds. With an ex-vessel value of $5.10 per pound, this mis-reported poundage is valued at over $60,000 and as a finished product the value would likely be in excess of $120,000.

As fish tickets were made out and turned in shortly after the closure of the Bristol Bay fishery, a vessel that did not count or weigh live crab would not have an accurate reporting poundage, as did these thirteen vessels listed in Table 2. After the number of cases were counted, weighed and in some cases, section weights taken in Seattle, a more accurate poundage would be generated. All of these discrepancies would be avoided if all processors, including catcher/processors were required to weigh live crab taken on board to process.

Table 1. Comparative average catches of catcher/processor vs. catcher vessels.

COMPARATIVE AVERAGE CATCHES OF CATCHER/PROCESSORS VS. CATCHER VESSELS

Season	1988	1987	1986
Number of C/P's	20	21	12
Number of Catchers	180(3)	215	147
Lbs. of C/P Catch	994,546	2,342,142	1,182,866
% C/P Catch(1)	13.5	19.0	10.4
Avg. C/P Catch	49,727	111,530	93,572
Avg. Catcher Catch(2)	35,515	46,265	69,463
Avg. CPUE C/P's	7.8	13.8	12.1
Avg. CPUE Catchers	8.2	8.9	11.7
Total Catch	7,387,258	12,289,067	11,393,934
Avg. # Pots Pulled C/P	1,039	1,376	1,502
Avg. # Pots Pulled Catcher	730	893	1,091
C/P Range Catch	19,796 - 98,875	5300 - 268,750	34,097 - 179,415

(1) C/P total catch divided by Total Catch.
(2) Total catch less C/P catch divided by number catcher only vessels.
(3) 182 vessels registered.

Table 2. Comparative catch information from fish tickets, observers and pack reports for the 1988 Bristol Bay red king crab fishery.

	Number of Crab		Number of Pounds		Number of Pounds	
Vessel	Fish Ticket	Observer	Fish Ticket	Pack Report	Over Reported	Under Reported
A	8,141	6,791(2)	49,628	50,665		1,037
B	4,570	4,570	28,334	28,748		414
C	12,620	11,169	67,015	62,603	4,412	
D	9,351	10,445	61,684	61,710		7,253
E	16,125	13,258(1)	98,875	92,719		6,156
F	7,000	6,190	48,733	46,258	2,475	
G	11,700	11,826	72,540	70,556	1,984	
H	3,193	3,192	19,796	20,093		297
I	6,615	6,615	38,367	39,683		1,316
J	12,730	12,729	75,107	74,274	833	
K	5,084	5,084	27,453	32,607		5,154
L	11,033	10,959	67,301	71,070		3,769
M	4,500	3,536	26,100	22,241	3,859	
				Total:	13,563	25,396

(1) Using observers report 76,233 pounds.
(2) Using observers report 41,425 pounds.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

MAY 11 1993

MEMORANDUM FOR: F/CM2 - Joe P. Clem

FROM: F/CM1 - Peter H. Fricke

SUBJECT: Amendment 28, BSAI Groundfish FMP

Thank you for sending me the above amendment for review.

The document, as written, contains no social impact assessment of the alternatives proposed. It is argued that this is because the nature of the amendment is a "re-districting" of fishing areas to enable catches to match biological productivity of Akta mackerel throughout the Aleutian Islands. However, the economic analysis and discussion in the RIR suggests that increased harvests of Akta mackerel may not be advantageous to the industry. Increased tonnages will depress ex-vessel prices; Akta mackerel has a number of substitutes, and increased catches will compete with these markets; and excess harvesting/processing capacity will not be fully absorbed by the TAC increases, and may contribute to over-fishing in the open fishery for Akta mackerel. All of these issues have social impacts/consequences for employment in the fishery and the long-term maintenance of fishing livelihoods.

I would recommend that a fishery impact statement be prepared to examine the effects, long- and short-term, of the proposed action on participants in the fishery, and in the other fisheries in which the harvesters and processors are involved.

cc: F/CM-RSchaefer, DCrestin; F/CM1-ABilik, RSurdi; F/CM2-CBelli

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

APR 26 1994

MEMORANDUM FOR: * Distribution

FROM: F/CM2 - Joe P. Clem

Joe P. Clem

SUBJECT: Review of North Pacific Fisheries Research Plan

The North Pacific Fishery Management Council has transmitted the North Pacific Fisheries Research Plan (Plan) for Secretarial review. The Plan would provide an industry-funded observer program and promote management, conservation, and scientific understanding of groundfish, halibut, and crab resources off Alaska. This action is being taken according to the requirements and the review schedule specified under section 313(c) of the Magnuson Fishery Conservation and Management Act.

Also provided for your information is the environmental assessment/regulatory impact review. Please provide your comments (including "no comment") by July 15, 1994. If you have any questions, please call Bill Chappell (301) 713-2341.

Attachments

*Distribution

F/CM
F/CM1 - Fricke, Surdi
F/CM2 - Clem, Hooker
F/CM4
F/EN - Pallozzi
GCF - Nielander
GCEL - Kuroc
Fx3 - Sissenwine
F/MS - Czerwonky
F/MB
F/BP - Oliver

F/PR2 - Montanio
F/HP - Karnella
F/RE - Everett
F/RE1 - Holliday
CS/EC - Weiting
N/ORM4 - Lewsey
GC - Johnson
OGC - Cohen
OMB - Arbuckle

ELEMENTS OF THE
NORTH PACIFIC FISHERIES RESEARCH PLAN

(as adopted by the North Pacific Fishery Management Council on June 28, 1992, and revised by the Council on December 7, 1993)

The Magnuson Act authorizes the Council and the Secretary to establish a North Pacific Fisheries Research Plan (Plan) which: (1) requires that observers be stationed on fishing vessels and at fish processing facilities and (2) establishes a system of fees to pay for the cost of implementing the Plan. The elements of the Plan being submitted for Secretarial review are presented below.

A. OBJECTIVES

1. Provide a framework for developing an observer program for the Alaska groundfish fishery, and halibut fisheries, which has the capability to perform in-season management, to accommodate status of stocks assessment and to provide accurate, real-time data of sufficient quality to implement an individual vessel incentive program. In the context of this Plan, the term groundfish is meant to include the halibut fisheries as well.

2. Provide a framework for developing an observer program for Bering Sea/Aleutian Islands king and Tanner crab fisheries which accommodates in-season management needs, ensures management compliance, and provides for the collection of biological and management data necessary to achieve the sustained yield of the crab resource without overfishing.

3. Ensure that the groundfish and crab observer programs are efficient and cost effective, that any increased costs are commensurate with the quality and usefulness of the data to be derived from any revisions to the programs, and that such changes are necessary to meet fishery management needs.

4. Provide for cooperation and coordination between the groundfish observer program administered by the NMFS and the crab observer program administered by the Alaska Department of Fish and Game (ADF&G).

B. ELEMENTS OF THE NMFS GROUNDFISH (HALIBUT) OBSERVER PROGRAM

1. Observer employment and contracts

    a. Observers will be either employees of NMFS or employees of NMFS observer contractors.

    b. Observer contracts will be subject to a competitive bid process and will comply with federal and/or agency procurement regulations. If cost effective and in accordance with procurement regulations, a minimum of three contractors will be used if three or more bidders are qualified.

    c. Observers must possess the education and specific training necessary to meet the requirements of the groundfish observer program as specified in the contracts issued by the Federal Government to provide groundfish and halibut observers.

2. Duties of observers

The observers' duties are described in detail in the NMFS observer manual, which is updated as necessary and is available from the NMFS Observer Program. Observer duties may include:

a. collecting data on catch, effort, bycatch, and discards of finfish and shellfish, including PSCs, and transmitting required data to facilitate in-season management;

b. collecting biological samples which may be used to determine species, length, weight, age and sex composition of catch and predator prey interactions;

c. collecting data on incidental take of marine mammals, seabirds, and other species as appropriate; and

d. other duties as described in the NMFS observer manual, available from the Alaska Fisheries Science Center.

3. Data collection, transmission, and input programs shall be implemented according to the following:

a. NMFS would be responsible for entering, editing, and maintaining all of the data collected by observers.

b. The Regional Director would review fishery monitoring programs and report to the Council on methods to improve data collection and sampling techniques, provide for real-time data transmission from the groundfish and halibut fleet, including daily reporting, and other measures as appropriate to improve the accuracy and efficiency of fishery monitoring programs.

c. NMFS could continue to release observer data authorized for disclosure under existing regulations and guidelines.

C. ELEMENTS OF THE ADF&G SHELLFISH ONBOARD OBSERVER PROGRAM

The State of Alaska Shellfish Onboard Observer Program would be incorporated within the provisions of the Research Plan. Subject to the availability of funds and the coverage priorities established for the Research Plan, State costs for observer coverage in the BSAI king and Tanner crab fisheries allowable under the Magnuson Act would be paid for by fees collected from the Research Plan fisheries (Section G).

1. Observer employment and contracts

a. Observers will be employees of ADF&G, NMFS, or NMFS observer contractors.

b. Observer contracts will be subject to a competitive bid process and will comply with federal and/or agency procurement regulations. If cost effective and in accordance with procurement regulations, a minimum of three contractors will be used if three or more bidders are qualified.

c. Observer deployment shall be determined by ADF&G.

d. Observers will possess the education and specific training necessary to meet the requirements of the crab observer program as specified in the contracts issued by the federal government to provide crab observers.

2. Duties of observers

The observers' duties are described in detail in the ADF&G observer manual, which will be updated as necessary. Crab observer duties include:

a. collecting data on catch, effort, bycatch and discards of finfish and shellfish, and transmitting required data to facilitate in-season management;

b. collecting biological samples which may be used to determine species, length, weight, age and sex composition of catch;

c. collecting data on marine mammals, seabirds, and other species as appropriate;

d. providing an effective means to ensure management compliance; and

e. other duties as described in the ADF&G observer manual.

3. Data collection, transmission, and input programs shall be implemented according to the following:

a. Initial implementation shall be as specified under existing regulations and guidelines to facilitate in-season management at the Dutch Harbor and Kodiak offices.

b. ADF&G shall review its fishery monitoring and data transmission programs in conjunction with NMFS, to help develop coordinated methods to improve data collection and sampling techniques, provide for real time data transmission from the fleet including daily reporting, and other measures as appropriate to improve the accuracy and efficiency of fishery monitoring programs and improve coordination between agencies.

D. ANNUAL DETERMINATION OF THE LEVEL OF OBSERVER COVERAGES FOR THE RESEARCH PLAN FISHERIES

1. Annual determination of the level of coverage

Levels of observer coverage may vary by fishery and vessel size depending upon the objectives to be met for each fishery. This applies to all groundfish and crab fisheries under North Pacific Fishery Management Council (Council) FMP jurisdiction and includes possible coverage for vessels participating in the halibut fisheries. During the first year of the Research Plan, observer coverage levels in the groundfish fishery would be as required by the Federal Observer Plan at the time the Research Plan is approved. All king and Tanner crab catcher/processors and mothership processors in the BSAI area would continue to carry observers under the State Shellfish Onboard Observer Program during the first year of the Research Plan. Starting with the second year of the Research Plan (January 1, 1996), the level of observer coverage would be determined annually by the Regional Director in consultation with the Council and the State of Alaska. In making that annual determination, the Council, State, and Regional Director will consider: (1) the levels of coverage required to provide reliable information for management purposes and to achieve the objectives of the Research Plan and (2) the amount of available funds.

2. In-season changes to the level of coverage

In-season changes to the levels of observer coverage for the groundfish, halibut, and crab fisheries to improve the accuracy and availability of observer data may be implemented by the Alaska Regional Director based on one or more of the following findings:

a. A significant change in fishing methods, times, or areas for a specific fishery or fleet component has occurred, or is likely to occur.

b. A significant change in catch or bycatch composition for a specific fishery or fleet component has occurred, or is likely to occur.

c. Any decrease in observer coverage due to unanticipated funding shortfalls must be consistent with the following priorities: 1) Accommodate status of stock assessments (i.e., collection of data on total catch, species composition, size, sex, and age); 2) inseason management; 3) bycatch monitoring; and 4) vessel incentive programs and regulatory compliance.

d. Such modifications are necessary to ensure or improve data availability or quality in order to meet specific fishery management objectives.

e. Any increased costs are commensurate with the quality and usefulness of the data to be derived from any revised program, and are necessary to meet fishery management needs.

The Regional Director would consult with the Commissioner of ADF&G prior to making inseason changes in observer coverage level for the crab observer program.

E. OBSERVER OVERSIGHT COMMITTEE

An Observer Oversight Committee (Committee) will be established by the Council Chairman to provide advice to the Council, the Board, the Commissioner of ADF&G, and the Regional Director on general provisions of the observer and fee portions of the Research Plan. NMFS, with the assistance of ADF&G, will annually provide Research Plan reports and budget documents to the Committee. The Committee will include industry representatives from the following groups: factory trawler, catcher trawler, shoreside processor, crab catcher vessel, freezer longliner, non-freezer longliner, crab catcher-processor, vessels under 60 feet (18.3 m) in length overall, observers, observer contractors, and independent observer training entities. The Committee will meet with NMFS and ADF&G staff within the annual cycle of the Research Plan to review the reports and budgets and provide input to the Council on fee levels and observer coverage needs. The Committee will not have oversight of the daily operations of the Federal and State observer programs.

F. COORDINATION BETWEEN THE NMFS GROUNDFISH PROGRAM AND THE ADF&G CRAB OBSERVER PROGRAM

1. Recognizing the differences in the missions between the ADF&G crab observer program and the NMFS groundfish observer program, but wishing to provide for the maximum efficiency in administration and implementation of the groundfish and crab observer programs, NMFS and ADF&G will form a work group to do the following:

   a. develop consistent, cost effective, and compatible observer training and debriefing procedures;

   b. develop consistent data collection, transmission, and processing systems including a single data base available to both agencies on a real-time basis;

   c. identify costs which are appropriate for reimbursement to the State pursuant to the Magnuson Act;

   d. review costs and identify possible cost savings measures, including the use of public or private contractors to perform some or all of the duties under the Plan; and

   e. review the costs and benefits of training groundfish observers in Alaska or elsewhere.

2. The University of Alaska, as an observer training entity, shall be included as an ex-officio member of the agency work group for the purpose of part F.1.a above.

3. On an annual basis, NMFS and ADF&G will provide to the Council a report detailing steps taken to improve overall coordination between the two observer programs and to improve administrative efficiency.

G. FEE ASSESSMENT

1. The following fisheries would be subject to fee assessment (Research Plan fisheries):

   a. Gulf of Alaska groundfish,

   b. Bering Sea and Aleutian Islands groundfish,

   c. North Pacific halibut off Alaska, and

   d. Bering Sea and Aleutian Islands king and Tanner crab.

2. Fees will be assessed at up to 2% of ex-vessel value of fish and crab harvested in the fisheries identified above. Fees will be expressed and assessed on the basis of ex-vessel value. In addition to the 2% limit, the fees are limited by the cost of the Plan after deducting for funds from other sources.

3. Fees from the program may only be used to pay for: (1) stationing observers including the direct costs of training, placing, maintaining, briefing, and debriefing observers; (2) collecting, verifying, and entering collected data (not manipulating data); (3) supporting an

insurance risk-sharing pool; and (4) paying the salaries of personnel to perform these tasks. The fees cannot be used to pay administrative overhead or other costs not directly incurred in carrying out the Plan, or to offset amounts authorized under other provisions of law.

4. All Research Plan fisheries will contribute to the total value of the fisheries. Annually, NMFS, in consultation with the Council and ADF&G, will use the best information available to project the value of fisheries. The projection will be based on factors that may include, but are not limited to standard ex-vessel prices by species or species group, projections of retained catch by species or species group, product form, and discards. NMFS will annually calculate standard ex-vessel prices of species harvested in Research Plan fisheries. The standard prices will be based both on ex-vessel price information from the most recent 12-month period for which data are available and on factors that are expected to change the average ex-vessel prices in the coming year. These standard ex-vessel prices, projections of retained catch, and the resulting projection of the total ex-vessel value of the Research Plan fisheries will be subjected to public review.

5. Annually the Regional Director, in consultation with the Council and ADF&G, will establish a fee percentage taking into account the value of the Research Plan fisheries, the percent of fee assessments that are expected to result in nonpayment, the costs of implementing the Plan, other sources of funds, and limitations on the total amount that can be collected. This will be done concurrent with Council approval of observer needs of the fisheries. This annual process will be completed by the time the fisheries commence. The fee will be expressed as a percentage of the ex-vessel value of the fisheries. The reports and budget documents outlined in this Plan shall be provided annually to the Council a month prior to its June meeting. The Observer Oversight Committee established by the Council shall review these budgets and reports and provide a recommendation to the Council at the June meeting. The Council will review the Committee's recommendation and take final action in September.

   NMFS's budget for implementing the groundfish (halibut) portion of the observer program shall include:

   a. costs for observer training and certification;

   b. costs for stationing observers on board fishing vessels and United States fish processors, including travel, salaries, benefits, insurance;

   c. costs for data collection, transmission, and input;

   d. contract services and general administrative costs, excluding overhead costs.

   ADF&G's budget for implementing the crab observer program shall include:

   a. costs for observer training and certification;

   b. costs for stationing observers on board crab vessels or at shoreside processors including travel, salaries, benefits, insurance;

   c. costs for data collection, transmission, and input;

d. contract services and general administrative costs, excluding overhead costs.

6. NMFS, with the assistance of ADF&G, will provide an estimate of the costs of providing required observer coverage for the groundfish (halibut) and shellfish programs for the coming year based on anticipated observer coverage and the anticipated costs of the activities listed under Item G.3 above, including any additional costs of utilizing observers.

7. NMFS will provide an estimate of surplus funds in the North Pacific Observer Fund and estimate the amounts of funds that may be available from other sources.

8. The fees shall be set such that the total amount of fees collected are not expected to exceed the limitation prescribed by the Magnuson Act.

9. The user fee percentage for the coming year will be the total amount to be collected divided by the ex-vessel value of the plan fisheries, multiplied by 100. This fee will be established before the fishing year to which it will apply. It will be subject to Council and public review before being finalized.

10. The State of Alaska will be reimbursed for all of the costs of the crab observer program which are allowable under the Magnuson Act from fees collected under the North Pacific Fisheries Research Plan, consistent with provisions of the Research Plan.

11. When an accurate, reliable, and equitable method of measuring discards is developed and implemented, they may be assessed the fee under the Research Plan. This would not include required discards or discards that are alive. The value to assign assessed discards will be determined at an appropriate time in the future.

H. FEE COLLECTION

1. Although the fee liability for a given amount of retained catch will be divided equally between the processor and harvesting vessel, processors will be responsible for collecting all fee assessments and for paying them bimonthly (i.e., every 2 months).

2. Fish processors are defined in the Magnuson Act; however, for purposes of collecting fees, harvesting vessels are considered processors when they sell directly to any entity other than a federally permitted processor under this plan.

3. A processor's bimonthly fee assessments for each species or species group would be calculated by NMFS by multiplying the fee percentage, times the standard ex-vessel price, times the actual amount of retained catch, expressed as round weight or round-weight equivalent.

4. Values for actual amount of retained catch to be used by NMFS in calculating fee assessments would be obtained through existing data reporting systems. These include Weekly Production Reports, ADF&G fish tickets or processor reports, and Individual Fishing Quota (IFQ) reports, when available.

5. If processors weigh or otherwise directly determine the amount of their retained catch, then those documented amounts may be used to estimate fee liability. Otherwise, product recovery rates published by NMFS and product weights will be used to estimate retained catch.

6. Processors will be billed bimonthly by NMFS for their fee assessments. Payments must be received by NMFS within 30 days of the issuance date of the bill. The NOAA Office of the Comptroller shall assess late charges for underpayment or late payments of fees. All payments will be deposited in the North Pacific Fishery Observer Fund (Fund) within the U.S. Treasury.

7. A processor would be required to notify the Regional Director, in writing, within 30 days of issuance of the bill, if any amount billed were disputed; the processor would be responsible for paying the undisputed amount of the bill within 30 days of its issuance, and for providing documentation supporting any claim of under- or over-billing. The Regional Director would review any disputed bill and the documentation provided by the processor, and would notify the processor of the finding and refund or credit the processor's account for any overpayment within 60 days of the date of issuance of the disputed bill. If a billing error has not occurred, the balance of the disputed bill would be due within 15 days of issuance of the determination. Interest penalty and administrative charges would be assessed for payments that are not received within 15 days.

8. All processors as defined under Item H(2) above will be required to have a federal permit to receive fish from Plan fisheries. Separate permit applications will be required for each processing vessel or shoreside facility, even if several vessels or facilities are owned by the same company. Permits will be issued for each of the two 6-month periods--January 1 through June 30, and July 1 through December 31. The permit issued by the Regional Director will continue in full force and effect for the period January 1 through June 30, or July 1 through December 31, of the year for which it was issued, or until it is revoked, suspended, or modified.

9. No permit will be issued until the permit application is complete and all fee assessments paid. Processors that have paid their accounts and submitted complete permit applications will be issued a permit within 30 days. Permits will not be issued to those processors not submitting complete applications and those whose accounts are past due, until their applications are complete and their accounts are paid.

10. Processing fish from Research Plan fisheries without a valid permit, or delivering fish from Research Plan fisheries to a processor not possessing a valid permit is prohibited. NMFS will make available to the public a list of those processors holding valid permits to process fish from Research Plan fisheries.

I. FIRST YEAR OF THE RESEARCH PLAN

In the absence of adequate start-up funds from other sources, the following program will be used during the first, or start-up year, of the Research Plan to obtain the necessary start-up funds for a fully functional Research Plan for the second year.

1. The Research Plan fees would be assessed and collected from all processors participating in Research Plan fisheries.

2. The observer requirements in the Federal Observer Plan and in the State BSAI king and Tanner crab regulations that are in effect when the Research Plan is approved would remain in effect during the start-up year.

3. Vessel operators and processors that currently are required to pay directly for observer coverage under the Federal Observer Plan and under State regulations would continue to pay directly for observer coverage.

4. For those whose direct observer payments are equal to or greater than the billed fee assessment, additional payments beyond direct payments will not be required.

J. FUNDING SHORTFALLS

In the event of a funding shortfall after implementation of the Research Plan, the available funds will be utilized according to the prioritized list of Research Plan objectives as follows:

1. Accommodate status of stocks assessment (i.e, collection of data on total catch, species composition, size, sex and age)
2. In-season management
3. Bycatch monitoring
4. Vessel incentive programs and regulatory compliance

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<u>DRAFT FOR SECRETARIAL REVIEW</u>

ENVIRONMENTAL ASSESSMENT/REGULATORY IMPACT REVIEW

FOR THE

NORTH PACIFIC FISHERIES RESEARCH PLAN

AMENDMENT 27 TO THE FMP FOR THE GROUNDFISH FISHERY IN THE BERING SEA ALEUTIAN ISLANDS AREA

AMENDMENT 30 TO THE FMP FOR GROUNDFISH FISHERY IN THE GULF OF ALASKA

AMENDMENT 3 TO THE FMP FOR THE COMMERCIAL KING AND TANNER CRAB FISHERIES IN THE BERING SEA AND ALEUTIAN ISLANDS AREA

REGULATORY AMENDMENT TO THE PACIFIC HALIBUT FISHERY REGULATIONS

Prepared by the staff of the
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March 22, 1994

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1.0 INTRODUCTION

Section 313 of the Magnuson Fishery Conservation and Management Act (Magnuson Act) authorizes the North Pacific Fishery Management Council (Council) to prepare, in consultation with the Secretary of Commerce (Secretary), a North Pacific Fisheries Research Plan (Research Plan) for all fisheries under the Council's jurisdiction except salmon. Any such plan would require observers to be stationed on fishing vessels and on fish processors or shoreside processing facilities as appropriate to collect data necessary for the conservation, management, and scientific understanding of any fisheries under the Council's jurisdiction, including halibut, but excluding salmon. It also would establish a system of fees to pay for the costs of implementing the Research Plan.

Working closely with industry, the National Marine Fisheries Service (NMFS), the Alaska Department of Fish & Game (ADF&G), and the Council initiated development of the Research Plan in late 1990. A draft EA/RIR for the Research Plan was initially reviewed by the Council and its advisory bodies at their January 15-17, 1991 meeting, and approved for public distribution and comment. After reviewing written comments and advice from its advisory bodies, and hearing public testimony at its meeting of April 23-26, 1991, the Council made further refinements to the Research Plan. A revised EA/RIR was reviewed by the Council and its advisory bodies at their April 20-26, 1992, meeting and approved for public distribution and comment. After reviewing written comments, obtaining further advice from its advisory bodies, and hearing public testimony at its June 23-28, 1992 meeting, the Council adopted the Research Plan and recommended that it be submitted to the Secretary for review. In preparation for submission, the EA/RIR was updated in March 1993 and the implementing regulations were drafted. As preparation of regulations proceeded, it became apparent that several changes should be considered before the Research Plan was submitted for Secretarial review. At its December 6-11, 1993 meeting, the Council discussed the Research Plan, accepted a recommendation by the Director, Alaska Region, NMFS (Regional Director) to make several modifications to the Research Plan, and recommended that the modified Research Plan be submitted to the Secretary for review.

If approved by the Secretary, the North Pacific Fisheries Research Plan will replace the current groundfish Observer Plan. Amendments to the Pacific Halibut fishery regulations and to the fishery management plans (FMPs) governing the Alaska groundfish and crab fisheries will be implemented to reference the provisions of the Research Plan concerning observer requirements in the groundfish, halibut, and crab fisheries.

1.1 Purpose of and Need for Action

On November 1, 1989 the Secretary approved Amendments 13 and 18 to the groundfish FMPs for the Bering Sea/Aleutian Islands Area and the Gulf of Alaska. The implementing regulations were published as a final rule on December 6, 1989 (54 FR 50386). One measure authorized a comprehensive domestic fishery observer program. An Observer Plan to implement the program was prepared by the Secretary in consultation with the Council and implemented by NOAA, effective February 7, 1990 (55 FR 4839, February 12, 1990).

The Observer Plan required specific levels of observer coverage which varied with the size of fishing vessels and the quantity of fish processed by floating and shoreside processors. The observer requirements were established because it was recognized that living marine resources could not be managed effectively without the types of information that were available only or most efficiently through an observer program. Each fishing vessel and processor required to have observer coverage was responsible for the cost of obtaining the required observers from a certified contractor. Three problems were identified for this method of payment for observer coverage: (1) it may not be equitable, (2) it limits the ability of NMFS to effectively manage the observer program, and (3) it may result in a conflict of interest that could reduce the credibility of observer data.

In April 1988, the Alaska Board of Fisheries adopted regulations requiring onboard observers for all vessels that process king crab and C. bairdi (Tanner) crab in the waters off Alaska. In 1990, this was expanded to include C. opilio (snow) crab. Although, the Shellfish Onboard Observer Program was adopted principally to enforce minimum size limits for crab, the program serves a variety of functions. The funding for the crab observer program is similar to that of the groundfish observer program. Therefore, the three problems are common to both observer programs.

The three problems were discussed during the development of the domestic observer program. However, there was no alternative method available for paying for observer coverage, such as that used for the foreign observer program. It was determined that an observer program with broad coverage, even with these problems, was preferable to the very limited coverage that otherwise would have been possible. However, it was also determined that action should be taken to develop an alternative funding mechanism. Industry support for developing an alternative method of paying for observer coverage is demonstrated by the willingness and ability of the industry to convince Congress and the President to amend the Magnuson Act to permit the establishment of the North Pacific Fisheries Research Plan.

The Magnuson Act includes the following requirements for a Research Plan.

1. Observers will be stationed for the purpose of collecting data necessary for the conservation, management, and understanding of any fisheries under the Council's jurisdiction except salmon.

2. A system of fees will be established to pay the implementation costs.

3. The Research Plan shall be reasonably calculated to:

    a. gather reliable data for the conservation, management, and scientific understanding of the fisheries covered by the Plan;

    b. be fair and equitable to all vessels and processors;

    c. be consistent with applicable provisions of law; and

    d. consider the operating requirements of the fisheries and the safety of observers and fishermen.

4. Any system of fees shall:

    a. limit the total fees to implementation costs minus any amounts authorized under other provisions of law and any surplus in the North Pacific Fishery Observer Fund;

    b. be fair and equitable to all participants in the fisheries;

c. provide that fees collected not be used to pay any costs of administrative overhead or other costs not directly incurred in carrying out the Research Plan;

d. not be used to offset amounts authorized under other provisions of law;

e. be expressed as a percentage not to exceed two percent of the exvessel value of the Research Plan fisheries;

f. be assessed against all fishing vessels and fish processors including those not required to have observers,

g. provide that the fees only be used for implementing the Research Plan; and

h. provide that fees collected will be deposited in the North Pacific Fishery Observer Fund.

Section 313 of the Magnuson Act also requires the Secretary to review the feasibility of establishing a risk sharing pool to provide insurance coverage for vessels and owners against liability from civil suits by observers. If such a pool is established, it also would be funded with the user fees discussed in this report. However, NMFS must first conduct a feasibility analysis on whether a government designed risk sharing pool is necessary. Such an analysis is not yet complete, and provisions of the risk sharing pool will be addressed separately from this document.

1.2 Purpose of this Document

This document provides background information and assessments necessary for the Secretary of Commerce to determine if the Research Plan is consistent with the Magnuson Act and other applicable law. It also provides the public with information to assess the alternatives that are being considered and to comment on the alternatives. These comments will enable the Council and Secretary to make more informed decisions concerning the resolution of the management problems being addressed.

1.2.1 Environmental Assessment

An environmental assessment (EA) is required by the National Environmental Policy Act of 1969 (NEPA) to determine whether the action considered will result in significant impact on the human environment. The environmental analysis in the EA provides the basis for this determination and must analyze the intensity or severity of the impact of an action and the significance of an action with respect to society as a whole, the affected region and interests, and the locality. If the action is determined not to be significant based on an analysis of relevant considerations, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. An environmental impact study (EIS) must be prepared for major Federal actions significantly affecting the human environment.

An EA must include a brief discussion of the need for the proposal, the alternatives considered, the environmental impacts of the proposed action and the alternatives, and a list of document preparers. The purpose and alternatives are discussed in Sections 1.1 and 2.0, and the list of preparers is in Section 6. Sections 3.1.1 and 4.1 contain discussions of the environmental impacts of the alternatives including impacts on threatened and endangered species and marine mammals.

1.2.2 Regulatory Impact Review

Another part of the package is the Regulatory Impact Review (RIR) that is required by NMFS for all regulatory actions or for significant Department of Commerce or NOAA policy changes that are of significant public interest. The RIR: (1) provides a comprehensive review of the level and incidence of social and economic impacts associated with a proposed or final regulatory action; (2) provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems; and (3) ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining if proposed regulations are significant under Executive Order (E.O.) 12866 and if proposed regulations will have a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (P.L. 96-354, RFA). The primary purpose of the RFA is to relieve small businesses, small organizations, and small governmental jurisdictions (collectively, "small entities") of burdensome regulatory and record-keeping requirements. The RFA requires that the head of an agency must certify that the regulatory and record-keeping requirements, if promulgated, will not have a significant effect on a substantial number of small entities or provide sufficient justification to receive a waiver.

This RIR analyzes the impacts of the alternatives that were considered. It also provides a description of and an estimate of the number of vessels and processors (small entities) to which regulations implementing the Research Plan would apply.

1.3 Description of the Domestic Fishing Fleet and Processors

Nearly 5,000 vessels are expected to operate in the Research Plan fisheries. The vast majority of these vessels, about 4,000, will participate in the halibut fishery. Over 1,000 of the vessels that land halibut are also expected to participate in other Research Plan fisheries. The vessels range from halibut fishery skiffs of less than 30 feet in length to crab and groundfish catcher/processors and motherships as large as 688 feet. These vessels use trawl gear and a variety of fixed gear. There are more than 100 onshore processing plants that receive fish from Research Plan fisheries. The range in annual production amounts by processors is similar to that of vessels.

Detailed descriptions of the BSAI and GOA groundfish fisheries are available in the Stock Assessment and Fishery Evaluation (SAFE) reports for these fisheries. Detailed descriptions of the BSAI crab fisheries are available in annual area management reports. The halibut fishery is described more fully in the Annual Report by the International Pacific Halibut Commission and in the EA/RIR for the IFQ program for the halibut fishery off Alaska.

2.0 DESCRIPTION OF THE ALTERNATIVES

Two alternatives were considered, the status quo and the establishment of a North Pacific Fisheries Research Plan.

2.1 Alternative 1: Status Quo

With Alternative 1, the Magnuson Act authority to establish a North Pacific Fisheries Research Plan would not be used. The existing observer requirements would remain in place for the groundfish fisheries and each vessel or processor that is required to have observer coverage would continue to be responsible for obtaining the required observers from a certified contractor. Changes in observer coverage requirements would require a regulatory amendment. If Federal funds are available for the groundfish observer program, they would be used to pay for NMFS program costs and, to the extent possible, for observers. NMFS program costs include the cost of training and outfitting observers, the cost of receiving, reviewing, entering, and maintaining observer data, the cost of briefing and debriefing observers, and the cost of managing the observer program. If Federal funds are not available to cover NMFS program costs, the groundfish observer program would be in jeopardy. The State of Alaska crab observer program would remain a separate program and no observer program would be implemented for the Pacific halibut fishery in Convention waters off Alaska.

2.2 Alternative 2: **(PREFERRED ALTERNATIVE)** Establish a North Pacific Fisheries Research Plan which includes a system of user fees to pay for its implementation costs

The Magnuson Act authorizes the Council, in consultation with the Secretary, to establish a North Pacific Fisheries Research Plan which: (1) requires that observers be stationed on fishing vessels and at fish processing facilities and (2) establishes a system of fees to pay for the cost of implementing the plan. The elements of the Research Plan being submitted for Secretarial review are presented in this section. During the development of the Research Plan, options were considered for many of its elements. The options that were considered but discarded prior to December 1993 were discussed in the March 2, 1993, draft of the EA/RIR. The options that were discarded at the December 1993 Council meeting are discussed in Chapter 3. The March 2, 1993 draft of the EA/RIR is attached as Appendix 1.

A. OBJECTIVES

1. Provide a framework for developing an observer program for the Alaska groundfish and halibut fisheries, which has the capability to perform in-season management, to accommodate status of stocks assessment and to provide accurate, real-time data of sufficient quality to implement an individual vessel incentive program. In the context of this Plan, the term groundfish is meant to include the halibut fisheries as well.

2. Provide a framework for developing an observer program for Bering Sea/Aleutian Islands king and Tanner crab fisheries which accommodates in-season management needs, ensures management compliance, and provides for the collection of biological and management data necessary to achieve the sustained yield of the crab resource without overfishing.

3. Ensure that the groundfish and crab observer programs are efficient and cost effective, that any increased costs are commensurate with the quality and usefulness of the data to be derived from any revisions to the programs, and that such changes are necessary to meet fishery management needs.

4. Provide for cooperation and coordination between the groundfish observer program administered by NMFS and the crab observer program administered by ADF&G.

B. ELEMENTS OF THE NMFS GROUNDFISH (HALIBUT) OBSERVER PROGRAM

1. Observer employment and contracts

   a. Observers will be either employees of NMFS or employees of NMFS observer contractors.

   b. Observer contracts will be subject to a competitive bid process and will comply with federal and/or agency procurement regulations. If cost effective and in accordance with procurement regulations, a minimum of three contractors will be used if three or more bidders are qualified.

   c. Observers must possess the education and specific training necessary to meet the requirements of the groundfish observer program as specified in the contracts issued by the Federal Government to provide groundfish and halibut observers.

2. Duties of observers

   The observers' duties are described in detail in the NMFS observer manual, which is updated as necessary and is available from the NMFS Observer Program. Observer duties may include:

   a. collecting data on catch, effort, bycatch, and discards of finfish and shellfish, including PSCs, and transmitting required data to facilitate in-season management;

   b. collecting biological samples which may be used to determine species, length, weight, age and sex composition of catch and predator prey interactions;

   c. collecting data on incidental take of marine mammals, seabirds, and other species as appropriate; and

   d. other duties as described in the NMFS observer manual, available from the Alaska Fisheries Science Center.

3. Data collection, transmission, and input programs shall be implemented according to the following:

   a. NMFS would be responsible for entering, editing, and maintaining all of the data collected by observers.

   b. The Regional Director would review fishery monitoring programs and report to the Council on methods to improve data collection and sampling techniques, provide for real-time data transmission from the groundfish and halibut fleet, including daily reporting, and other measures as appropriate to improve the accuracy and efficiency of fishery monitoring programs.

c. NMFS could continue to release observer data authorized for disclosure under existing regulations and guidelines.

C. ELEMENTS OF THE ADF&G SHELLFISH ONBOARD OBSERVER PROGRAM

The State of Alaska Shellfish Onboard Observer Program would be incorporated within the provisions of the Research Plan. Subject to the availability of funds and the coverage priorities established for the Research Plan, State costs for observer coverage in the BSAI king and Tanner crab fisheries allowable under the Magnuson Act would be paid for by fees collected from the Research Plan fisheries (Section G).

1. Observer employment and contracts

   a. Observers will be employees of ADF&G, NMFS, or NMFS observer contractors.

   b. Observer contracts will be subject to a competitive bid process and will comply with federal and/or agency procurement regulations. If cost effective and in accordance with procurement regulations, a minimum of three contractors will be used if three or more bidders are qualified.

   c. Observer deployment shall be determined by ADF&G.

   d. Observers will possess the education and specific training necessary to meet the requirements of the crab observer program as specified in the contracts issued by the federal government to provide crab observers.

2. Duties of observers

   The observers' duties are described in detail in the ADF&G observer manual, which will be updated as necessary. Crab observer duties may include:

   a. collecting data on catch, effort, bycatch and discards of finfish and shellfish, and transmitting required data to facilitate in-season management;

   b. collecting biological samples which may be used to determine species, length, weight, age and sex composition of catch;

   c. collecting data on marine mammals, seabirds, and other species as appropriate;

   d. providing an effective means to ensure management compliance; and

   e. other duties as described in the ADF&G observer manual.

3. Data collection, transmission, and input programs shall be implemented according to the following:

   a. Initial implementation shall be as specified under existing regulations and guidelines to facilitate in-season management at the Dutch Harbor and Kodiak offices.

b. ADF&G shall review their fishery monitoring and data transmission programs in conjunction with NMFS, to help develop coordinated methods to improve data collection and sampling techniques, provide for real time data transmission from the fleet including daily reporting, and other measures as appropriate to improve the accuracy and efficiency of fishery monitoring programs and improve coordination between agencies.

D. ANNUAL DETERMINATION OF THE LEVEL OF OBSERVER COVERAGE FOR THE RESEARCH PLAN FISHERIES

1. Annual determination of the level of coverage

Levels of observer coverage may vary by fishery and vessel size depending upon the objectives to be met for each fishery. This applies to all groundfish and crab fisheries under North Pacific Fishery Management Council (Council) FMP jurisdiction and includes possible coverage for vessels participating in the halibut fisheries. During the first year of the Research Plan, observer coverage levels in the groundfish fishery would be as required by the Federal Observer Plan at the time the Research Plan is approved. All king and Tanner crab catcher/processors and mothership processors in the BSAI area would continue to carry observers under the State Shellfish Onboard Observer Program during the first year of the Research Plan. Starting with the second year of the Research Plan (January 1, 1996), the level of observer coverage would be determined annually by the Regional Director in consultation with the Council and the State of Alaska. In making that annual determination, the Council, State, and Regional Director will consider: (1) the levels of coverage required to provide reliable information for management purposes and to achieve the objectives of the Research Plan and (2) the amount of available funds.

2. In-season changes to the level of coverage

In-season changes to the levels of observer coverage for the groundfish, halibut, and crab fisheries to improve the accuracy and availability of observer data may be implemented by the Alaska Regional Director based on one or more of the following findings:

a. A significant change in fishing methods, times, or areas for a specific fishery or fleet component has occurred, or is likely to occur.

b. A significant change in catch or bycatch composition for a specific fishery or fleet component has occurred, or is likely to occur.

c. Any decrease in observer coverage due to unanticipated funding shortfalls must be consistent with the following priorities: (1) Accommodate status of stock assessments (i.e., collection of data on total catch, species composition, size, sex, and age); (2) inseason management; (3) bycatch monitoring; and (4) vessel incentive programs and regulatory compliance.

d. Such modifications are necessary to ensure or improve data availability or quality in order to meet specific fishery management objectives.

e. Any increased costs are commensurate with the quality and usefulness of the data to be derived from any revised program, and are necessary to meet fishery management needs.

The Regional Director would consult with the Commissioner of ADF&G prior to making inseason changes in observer coverage level for the crab observer program.

E. OBSERVER OVERSIGHT COMMITTEE

An Observer Oversight Committee (Committee) will be established by the Council Chairman to provide advice to the Council, the Board, the Commissioner of ADF&G, and the Regional Director on general provisions of the observer and fee portions of the Research Plan. NMFS, with the assistance of ADF&G, will annually provide Research Plan reports and budget documents to the Committee. The Committee will include industry representatives from the following groups: factory trawler, catcher trawler, shoreside processor, crab catcher vessel, freezer longliner, non-freezer longliner, crab catcher-processor, vessels under 60 feet (18.3 m) in length overall, observers, observer contractors, and independent observer training entities. The Committee will meet with NMFS and ADF&G staff within the annual cycle of the Research Plan to review the reports and budgets and provide input to the Council on fee levels and observer coverage needs. The Committee will not have oversight of the daily operations of the Federal and State observer programs.

F. COORDINATION BETWEEN THE NMFS GROUNDFISH PROGRAM AND THE ADF&G CRAB OBSERVER PROGRAM

1. Recognizing the differences in the missions between the ADF&G crab observer program and the NMFS groundfish observer program, but wishing to provide for the maximum efficiency in administration and implementation of the groundfish and crab observer programs, NMFS and ADF&G will form a work group to do the following:

   a. develop consistent, cost effective, and compatible observer training and debriefing procedures;

   b. develop consistent data collection, transmission, and processing systems including a single data base available to both agencies on a real-time basis;

   c. identify costs which are appropriate for reimbursement to the State pursuant to the Magnuson Act;

   d. review costs and identify possible cost savings measures, including the use of public or private contractors to perform some or all of the duties under the Plan; and

   e. review the costs and benefits of training groundfish observers in Alaska or elsewhere.

2. The University of Alaska, as an observer training entity, shall be included as an ex-officio member of the agency work group for the purpose of part F.1.a above.

3. On an annual basis, NMFS and ADF&G will provide to the Council a report detailing steps taken to improve overall coordination between the two observer programs and to improve administrative efficiency.

G. ANNUAL DETERMINATION OF RESEARCH PLAN FEE PERCENTAGE

NMFS would establish annually a Research Plan fee percentage for the upcoming calendar year. The fee percentage would be based on standard exvessel prices by species and on projections of the following: (1) retained catches by species (i.e., catch retained by either at-sea or shoreside processors) in all Research Plan fisheries, (2) program costs, and (3) the surplus in the North Pacific Fishery Observer Fund, other sources of funding for the Plan, and nonpayment. After consulting with the Council and State, NMFS would publish the fee percentage and the values of the variables on which it is based in the Federal Register and invite comments. After considering comments received and again consulting with the Council and the State, NMFS would publish final values in the Federal Register.

1. Research Plan fisheries

The following fisheries would be Research Plan fisheries and would be subject to the fee assessment:

a. Gulf of Alaska groundfish (EEZ only),

b. Bering Sea and Aleutian Islands groundfish (EEZ only),

c. North Pacific halibut off Alaska (all Convention waters off Alaska), and

d. Bering Sea and Aleutian Islands king and Tanner crab (EEZ only).

Future recommendations by the Council to include other fisheries under the Research Plan would require an amendment to the Research Plan.

2. Standard Exvessel Prices

NMFS would annually establish standard exvessel prices for species harvested in Research Plan fisheries. These prices would be used in estimating the exvessel value of the Plan fisheries for the coming year. The standard exvessel prices would be based on: (1) exvessel price information for the most recent 12-month period for which data are available, (2) factors that are expected to change exvessel prices in the upcoming calendar year, and (3) other information that may affect expected exvessel prices in the upcoming calendar year.

3. Retained Catch

Retained catch by species for the Research Plan fisheries would be projected annually for the upcoming calendar year using the best available information concerning expected catches and discards.

4. Total Exvessel Value

NMFS would annually calculate the total exvessel value of retained catches for Research Plan fisheries as the sum of the product of the standard exvessel prices and projected retained catches by species.

5. Program Costs

NMFS and ADF&G would each prepare an annual budget that identifies expected recoverable Research Plan cost for the upcoming calendar year. Recoverable costs identified in each budget would include: (1) costs for observer training, certification, briefing, and debriefing; (2) costs for stationing observers, including travel, salaries, benefits, and insurance; (3) costs for data collection, transmission, input, processing, and management; (4) contract services and general program operational costs, excluding overhead; and (5) the cost of the risk sharing pool, if one is established. The estimated budget would be based on anticipated observer coverage and the anticipated costs directly incurred in carrying out the Research Plan.

6. Surplus Funds, Other Sources of Funding, and Fee Nonpayment

Annually, NMFS would make a projection of each of the following: (1) the surplus that would be in the North Pacific Fishery Observer Fund at the end of the current calendar year (2) the funds that would be available from other sources for use in funding the Research Plan during the upcoming calendar year, and (3) the nonpayment rate on fees assessed under the Research Plan during the upcoming calendar year.

7. Calculation of the Fee Percentage

Annually, the fee percentage for the upcoming calendar year will be set equal to which ever is less, the fee percentage calculated using the following equation or 2%.

Fee percentage = [100 x (RRPC - FB - OF)/V]/(1 - NPR)

where RRPC is the projection of recoverable Research Plan costs for the coming year, FB is the projected end of the year Fund balance, OF is the projection of other funding for the coming year, V is the projected exvessel value of retained catch in the Research Plan fisheries for the coming year, and NPR is the percent of fee assessments that are expected to result in nonpayment.

If the fee percentage calculated using this formula is greater than 2%, there would be a funding shortfall due to the 2% limit in the Magnuson Act. This would require a reevaluation of the levels of coverage that would be required and funded. Available funds would be utilized to address the Research Plan objectives, in the following priority: (1) stock assessment; (2) in-season management; (3) bycatch monitoring; and (4) vessel incentive programs and regulatory compliance.

H. FEE COLLECTION

1. Although, the fee liability for a given amount of retained catch will be divided equally between the processor and harvesting vessel, processors will be responsible for collecting all fee assessments and for paying them bimonthly (i.e., every 2 months).

2. Fish processors are defined in the Magnuson Act; however, for purposes of collecting fees, harvesting vessels are considered processors when they sell directly to any entity other than a federally permitted processor under this plan.

3. A processor's bimonthly fee assessments for each species or species group would be calculated by NMFS by multiplying the fee percentage, times the standard exvessel price, times the actual amount of retained catch, expressed as round weight or round-weight equivalent. For example, if the fee percentage for Research Plan fisheries were 1.0% and the standard exvessel price of pollock were $0.09/lb, a retained catch of 500,000 lbs of pollock would result in a fee assessment due from the processor of 0.01 X $0.09/lb. X 500,000 lbs which is $450.

4. Values for actual amount of retained catch to be used by NMFS in calculating fee assessments would be obtained through existing data reporting systems. These include Weekly Production Reports, ADF&G fish tickets, and Individual Fishing Quota (IFQ) reports, when available.

5. If these processors weigh or otherwise directly determine the amount of their retained catch, then those documented amounts will be used to estimate fee liability. Otherwise, product recovery rates published by NMFS and product weights will be used to estimate retained catch. For crab at-sea processors, scale weights of sample catches will be used to estimate total weight of retained catch. If a more reliable system for determining total weights is implemented in the future, the regulations would be amended accordingly.

6. Processors would be billed bimonthly by NMFS for their fee assessments. Payments must be received by NMFS within 30 days of the issuance date of the bill. The NOAA Office of the Comptroller shall assess late charges for underpayment or late payments of fees. All payments would be deposited in the North Pacific Fishery Observer Fund (Fund) within the U.S. Treasury.

7. A processor would be required to notify the Regional Director, in writing, within 30 days of issuance of the bill, if any billed amount is disputed. The processor would be responsible for paying the undisputed amount of the bill within 30 days of its issuance, and for providing documentation supporting the disputed amount claimed to be under- or over-billed. Within 60 days of the date of issuance of the disputed bill the Regional Director would review the disputed bill and the documentation provided by the processor, and would notify the processor of his determination. If the Regional Director determines a billing error had occurred, the processor's account would be rectified by credit or subsequent billing. If the Regional Director determines that a billing error has not occurred, the balance of the disputed bill would be due within 15 days of issuance of the determination. Interest penalty and administrative charges would be assessed for payments that are not received within 15 days. Processor permits would not be issued until all fee assessments are paid.

8. All processors as defined under Item H(2) above would be required to have a federal permit to receive fish from Plan fisheries. Separate permit applications would be required for each processing vessel or shoreside facility, even if several vessels or facilities are owned by the same company. Permits would be issued for each of the two 6-month periods--January 1 through June 30, and July 1 through December 31. The permit issued by the Regional Director will continue in full force and effect for the period January 1 through June 30, or July 1 through December 31, of the year for which it was issued, or until it is revoked, suspended, or modified.

9. No permit would be issued until the permit application is complete and all fee assessments paid. Processors that have paid their accounts and submitted complete permit applications will be issued a permit within 30 days. Permits would not be issued to those processors not submitting complete applications and those whose accounts are past due, until their applications are complete and their accounts are paid.

10. Processing fish from Research Plan fisheries without a valid permit, or delivering fish from Research Plan fisheries to a processor not possessing a valid permit would be prohibited. NMFS would make available to the public a list of those processors holding valid permits to process fish from Research Plan fisheries.

I. FIRST YEAR OF THE RESEARCH PLAN

1. During the first, or start-up year, of the Research Plan, NMFS would accumulate necessary start-up funds in the Fund. Fees would be assessed against all fishing vessels and U.S. fish processors participating in Research Plan fisheries under the jurisdiction of the Council. Processors would be responsible for collecting all fee assessments and for paying them bimonthly.

2. The same groundfish observer coverage requirements that are currently required by the Federal Observer Plan, and observer coverage requirements that are currently required in the existing State BSAI king and Tanner crab regulations (5 AAC 39.645), would remain in effect during the start-up year.

3. Vessel operators and processors that are required to have observer coverage under the Federal Observer Plan and under State regulations would continue to provide observer coverage during the first year of the Research Plan.

4. Rebates would be made to those who paid for observer coverage under the Research Plan. The rebate per standard observer day would equal whichever is less,the actual payment to an observer contractor per standard observer day or the standardized cost of a standard observer day. The standardized cost would be based on the estimate(s) of the cost per observer day used to calculate both the total cost of the Research Plan and the fee percentage. "Standard observer day" is defined as all or part of a 24-hour period that begins at 00:01 hours Alaska local time (A.l.t.) and ends at 24:00 A.l.t. during which an observer is stationed on a vessel or at a shoreside facility for purposes of complying with observer coverage requirements. A standard observer day cannot be attributed to more than one vessel or shoreside facility.

5. The rebate for a vessel or processor may exceed its fee payment. However, the rebate for a processor would be dependent on it being current with respect to submitting its fee payments.

6. The rebates would be based on information provided to NMFS by the observer contractors. That information would include the number of standard observer days paid for by each vessel and processor and the amount paid for those observer days. The required information would be submitted by each observer contractor within 15 days after each month that it received payments for providing observers. Rebates for the first two months of observer coverage would be issued by July and subsequent rebates would be issued on a more regular basis, likely bimonthly.

7. NMFS believes that funds equal to approximately two-thirds of the current estimated annual cost needed to operate the Research Plan is the minimum amount needed to begin full operation of the Research Plan and to ensure that cash flow is adequate to meet start-up costs. Pending approval of regulations implementing the Research Plan, full implementation of the observer and fee portions of the Research Plan are anticipated to begin January 1, 1996.

3.0 ANALYSIS OF THE ALTERNATIVES

The analysis of the two alternatives is in terms of (1) the expected differences in effects between Alternative 1 (the status quo) and Alternative 2 (establishing a Research Plan) and (2) the Magnuson Act requirements for a Research Plan (see Sections 3.1 and 3.2, respectively). Changes approved by the Council in December 1993 and clarifications and modifications since the December 1993 Council Meeting are addressed in Sections 3.3 and 3.4.

3.1 Expected Differences in Effects between Alternative 1 and Alternative 2

The Magnuson Act was amended to provide the authority to establish a Research Plan. This was done because, in the absence of such a Plan, the vessels and onshore processors with observer coverage requirements would continue to be responsible for the cost of obtaining the required observers from a certified contractor. Three problems were identified initially for this method of payment for observer coverage. They are as follows: (1) it may not be equitable, (2) it limits the ability of NMFS to effectively manage the observer program, and (3) it may result in a conflict of interest that could reduce the credibility of observer data. An additional problem occurred in 1993 when failure of a contractor to pay observers resulted in a demoralizing effect on the observers. Each of these problems is discussed below.

The current source of funding is considered by many to be inequitable because although all participants in the groundfish, halibut, and crab fisheries benefit from the groundfish and crab observer programs, only those with observer coverage requirements bear the cost; among those that bear this cost, the cost varies substantially in terms of the exvessel value of their catch. The cost paid by an operation is not dependent on either the benefits it receives from the observer coverage or its ability to pay for observer coverage. This situation would remain unchanged under Alternative 1. Once the Research Plan is fully implemented, payments for observer coverage would be based on retained catch and standardized exvessel prices. Therefore, the cost of observer coverage would be linked much more closely to both the benefits each participant receives from the observer program and the participant's ability to pay for observer coverage.

The second problem is that this method of payment for observers also limits the level of control NMFS has over the observer program and thus its ability to effectively manage the program. The certified contractors are not solely responsible to NMFS for the quality of their work performance, creating conflicting concerns between their clients to which they are providing observers and their responsibilities to NMFS.

The third problem is that this method of payment for observer coverage results in a potential conflict of interest between the certified observer contractors and their observers and the owners of vessels and processing plants to which observers are provided. The owners and operators of vessels and processing plants now have the responsibility for making arrangements with a certified observer contractor of their choice to meet observer requirements and for paying the costs of the observer directly to that contractor. This direct business relationship and the ability of an operation to select among the group of certified contractors mean that each contractor and, indirectly, the observers are essentially working for the operations they are observing. This provides an effective way for an operation to reward or penalize contractors and their observers and thus control the work performance of the observer and quality of data collected.

The nonpayment problem and the second and third problems can only be addressed partially under the status quo (Alternative 1). The observer conduct, conflict of interest standards for observers and contractors, and reasons for revoking contractor or observer certification that are included in the

Observer Plan can be modified to reduce but not eliminate these problems. The Research Plan (Alternative 2) would provide substantial improvements with respect to these problems by replacing the direct business relationship between the observed operations and observer contractors with a direct business relationship between NMFS and observer contractors.

Compared to the status quo, the Research Plan has two additional benefits. First, it provides greater flexibility for changing groundfish observer coverage in response to changing conditions. Second, it may provide a more secure source of funding for observer program costs beyond the cost of stationing observers on vessels and at processing plants.

With the Research Plan, the level of observer coverage will be set annually based on the objectives of the Plan and expected funding; and the Regional Director will have the authority to make in-season changes to observer coverage requirements. Currently, a regulatory amendment is required to change observer coverage in the groundfish fisheries. This increased ability to make timely changes in groundfish and crab observer coverage requirements may be very beneficial given the variability of the biological and economic factors that determine the optimal levels of coverage.

The cost of the domestic groundfish observer program, excluding the cost of stationing observers, has been about $1.6 million per year. Alaska Groundfish Log Book Program funds have provided $0.1 million and the rest of this cost has been covered principally by Marine Mammal Protection Act (MMPA) funds. The observer program has to compete for MMPA funds on an annual basis and the amount of funding that will be received can change. Under Alternative 1, it is not clear how the observer program would be funded if adequate MMPA funds are not available. With the Research Plan, the funds generated by the Research Plan fees would be available to offset reductions in MMPA funds.

The above benefits are not without costs. The adverse effects of the Research Plan include increased program costs, the potential for the 2% limit on the fee percentage rate to prevent adequate observer coverage, and a redistribution of observer program costs among individual participants in the Research Plan fisheries.

Increased Costs The cost of the Research Plan is expected to exceed the cost of the current Observer Plan by more than $1 million. This includes an additional $0.1 million for the management of the observer program and $0.6 million for administering and enforcing the fee collection program. The latter consists of $0.2 million for the Alaska Region and NOAA Finance to administer the program, $0.3 million for NOAA enforcement, and $0.1 million for Justice Department prosecutions.

The Research Plan may also increase the direct cost of observer coverage. The following types of changes would tend to increase these costs.

1. Processors may be less willing to provide bunkhouse use to observers.

2. Vessels may be less willing to allow observers to sleep and eat on the vessel when the vessel is in port.

3. Vessels and processors will have less of an incentive to share observers efficiently.

4. Vessels and processors will have less of an incentive to minimize the observer coverage they have.

The first two types of changes would tend to redistribute and increase the cost of housing and feeding observers. The third type of changes will tend to increase the cost per coverage day by decreasing the number of observer coverage days per month of observer employment. The last type of change will increase the total number of observer coverage days. It is difficult to estimate the magnitude of the cost increase that will result from these types of changes. Given that the current direct cost of observer coverage in the groundfish and crab fisheries is between \$6 million and \$7.4 million, these changes could increase direct costs by more than \$0.5 million. In that case, the Research Plan would cost \$1.2 million more than the Observer Plan.

<u>Will the 2% limit on the fee percentage rate prevent adequate observer coverage?</u> Under the Research Plan, observer coverage will be limited by the level of funding that is available from the fees and other Federal funds. However, given that the cost of the Research Plan is expected to be about \$11 million, of which about \$1.6 million historically has been paid for with Federal funds, and given that the exvessel value of the Research Plan fisheries is expected to exceed \$800 million, the 2% fee would provide \$16 million which is \$6.6 million or 70% more than the \$9.4 million needed from the fees. This suggests that the 2% limit will not prevent adequate observer coverage unless there is a substantial increase in the cost of adequate coverage relative to the value of the Research Plan fisheries and the availability of other Federal funds.

<u>The redistribution of observer program costs among individual participants in the Research Plan fisheries.</u> One of the objectives of the Research Plan is to have a more equitable distribution of the costs of observer coverage. With the Research Plan, the harvesters and processors will pay for observer coverage based on the amount of fish and crab they retain from Research Plan fisheries and standardized exvessel prices for each species or species group. Compared to the status quo, this will increase the costs of the observer programs for some operations, decrease it for some, and leave it unchanged for other operations. The first group will include those who currently have no observer coverage requirements and those who have low observer coverage requirements relative to the exvessel value of the fish they retain. The second group will include those who have high observer coverage requirements relative to the exvessel value of the fish they retain. If the current cost of observer coverage is \$200 per day, if the fee percentage is 1%, if both the harvester and processor pay half of the fee, and if the total cost of the observer program does not change, the break-even point for a harvester or processor with 100% observer coverage is \$40,000 of exvessel value per day. That is, a harvester or processor with more than \$40,000 of exvessel value per day will pay more under the Research Plan than with the status quo and the opposite will be true for a harvester or processor with less than \$40,000 of exvessel value per day. For an operation with 30% observer coverage, the break-even point is \$12,000 per day. Those in the group that will have higher costs may not consider this a desirable change in the distribution of costs; however, in terms of either the benefits received from the observer program or the ability to pay for observer coverage, the distribution of costs tends to be better once the Research Plan is implemented fully.

During the first year of the Research Plan, when those with observer requirements will still be responsible for paying observer contractors directly and when rebates will be used to offset most of the cost of those direct payments, the distribution of costs will tend to be minimally less equitable than it will be under full implementation. With the combination of direct payments to observer contractors, fee payments to NMFS, and refunds from NMFS, the cost for each vessel and processor will be approximately equal to what it would pay if it were only subject to the fee percentage that will be established for the first year of the Research Plan.

3.1.1 Biological Considerations

The biological impacts generally associated with fishery management actions are effects resulting from 1) harvest of fish stocks which may result in changes in food availability to predators, changes in the population structure of target fish stocks, and changes in community structure; 2) changes in the physical and biological structure of the benthic environment as a result of fishing practices, e.g., effects of gear use and fish processing discards; and 3) entanglement/entrapment of non-target organisms in active or inactive fishing gear. A summary of the effects of the 1994 groundfish total allowable catch amounts on the biological environment and associated impacts on marine mammals, seabirds, and other threatened or endangered species are discussed in the final environmental assessment for the 1994 groundfish total allowable catch specifications.

The Research Plan is expected to increase the quality of the data provided by the observer program and thus result in more informed and better management decisions being made. This should result in improved conservation and management for living marine resources in the BSAI and GOA. Although the expectation is that this will result in ecological benefits, the specifics and magnitudes of these benefits are not known.

3.1.2 Economic Considerations

The Research Plan and the resulting improvements in conservation and management are expected to increase net benefits to the Nation. However, as with the ecological benefits, the specifics and magnitudes of these benefits are uncertain.

3.1.2.1 Reporting Costs

Alternative 1, the status quo, would not require a change in reporting requirements or costs.

Alternative 2 would require 4 separate information collections from participants in the Research Plan fisheries. Descriptions and derivation of industry burden and costs are set forth in the Supporting Statement for Collection of Information prepared for the North Pacific Fisheries Research Plan[1]. A brief description of these collections and associated costs follow:

Federal Processing Permit Application

All processors of GOA groundfish, BSAI groundfish, BSAI king and Tanner crab, and Pacific halibut taken from convention waters off Alaska (Research Plan fisheries) would be required to complete a Federal Processing Permit Application on a semi-annual basis. Permits would be valid for the periods January 1 through June 30, and July 1 through December 31, each year. The preprinted application form would be distributed to all known qualifying processors, and notification of the availability of applications would annually be published in the Federal Register. The information collected on the permit application is necessary to issue permits that would be used to ensure compliance with the fee collection system. A permit would not be issued if prior fee assessments were past due, and no permit would be issued until such time that the processor's fee assessments were paid. The estimated cost to the 681 processors that may involved in Research Plan Fisheries and who would be required to comply with this permit requirement is $21,000 annually.

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[1] A copy of the Supporting Statement for Collection of Information prepared for the North Pacific Fisheries Research Plan may be obtained from the Alaska Regions, NMFS, P.O. Box 21668, Juneau, Alaska 99802 (Attn: Lori Gravel).

Observer Coverage Rebate Application

Information on this form would be required only during the first year of the Research Plan to collect data on which to base the issuance of rebates to the industry for direct observer costs. All NMFS-certified observer contractors and observer contractors supplying observers to catcher processor vessels participating in the Alaska crab fisheries would be required to submit this application form to NMFS within 15 days after receiving payment for observer coverage. Observer contractors would be required to submit completed Observer Coverage Rebate Application forms within 15 days after the end of each calendar month that they receive payment for observer coverage. NMFS would use this information to rebate vessel owners and processors for direct observer costs. Without this collection, vessel owners and processors could not be reimbursed for direct observer costs during the first year of the Research Plan and would be burdened with the cost of paying both direct observer costs and Research Plan fee assessments during this period. The estimated cost to the 10 observer contractors that may provide observer services during the first year of the Research Plan is estimated at $15,470.

Process to Resolve Billing Disputes

Bills would be issued to processors every 2 months. A processor would be required to notify the Director, Alaska Region, NMFS, (Regional Director), in writing, within 30 days of issuance of the bill, if any billed amount is disputed. The processor would be responsible for paying the undisputed amount of the bill within 30 days of its issuance, and for providing documentation supporting the disputed amount claimed to be under- or over-billed. Within 60 days of the date of issuance of the disputed bill the Regional Director would review the disputed bill and the documentation provided by the processor, and would notify the processor of his determination. If the Regional Director determines a billing error had occurred, the processor's account would be rectified by credit or subsequent billing. If the Regional Director determines that a billing error has not occurred, the balance of the disputed bill would be due within 15 days of issuance of the determination. It is expected that the documentation submitted by the processor for this process would consist of information already maintained in the course of doing business. If 10 percent of the anticipated number of bills issued are disputed, costs to the industry could exceed $12,000 annually.

Notification Requirements

All operators of vessels and processors participating in Research Plan Fisheries who are required to meet specific levels of observer coverage under the Research Plan would be required to notify the appropriate observer contractor, in writing or by facsimile copy, no less than 60 days prior to their need for an observer, to ensure that an observer would be available. Information requested would be the name of the vessel or processor; and the estimated dates, location, and duration for which an observer is being requested. This notification is necessary to arrange for the hiring, training, and deployment of observers. A second notification by processors and vessel owners required to carry observers, no less than 10 days prior to their need for an observer, would be required in writing, facsimile copy, or by telephone. The total number of responses under this requirement will depend on the number of observer deployments. NMFS estimates that total costs to the industry to comply with this requirement could exceed $11,000 annually.

3.1.2.2 Administrative, Enforcement, and Information Costs

Alternative 1 would not change administrative, enforcement, and information costs. Alternative 2 would increase these annual costs by approximately $0.7 million. This includes the cost of meeting the increased responsibilities that NMFS would have to manage the observer program and the cost of implementing the system of user fees. The latter includes the cost of obtaining the information necessary to establish the fee and calculate fee liabilities for processors. It also includes enforcement and prosecution costs associated with collecting the fees and the cost of administering the North Pacific Fishery Observer Fund.

For the groundfish and crab fisheries, the fees would only be assessed on retained catch from the EEZ. This will require a change in reporting areas for the groundfish fisheries. It will also be very difficult to enforce for vessels that operate both in the EEZ and in other areas during a trip. The amount of catch incorrectly reported from non-EEZ areas is expected to increase.

3.1.2.3 Impacts on Consumers

The choice that is made between these two alternatives is not expected to have a measurable effect on consumers. The differences in neither the cost of the required observer coverage nor the redistribution of that cost is expected to result in a measurable change in the quantities of seafood products available to consumers or the prices of these products.

3.1.2.4 Distribution of Benefits and Costs

Compared to Alternative 1, Alternative 2 is expected to result in what many would consider a more equitable distribution of the cost of meeting the current observer requirements for the groundfish fisheries. It is also expected to increase the ability of NMFS to effectively manage the observer program and to eliminate a conflict of interest that could decrease the credibility of observer data. These benefits will be accompanied by a $1.2 million increase in the cost of the observer program including fee collection costs. The redistribution of costs will be from observed operations that would otherwise bear a disproportionally large part of the cost of the observer program to those who would otherwise pay for none or a disproportionally small part of that cost.

3.2 Consistency with Magnuson Act Requirements for the North Pacific Fisheries Research Plan

The Research Plan meets the requirements established in the Magnuson Act. Specifically, the Plan will require that observers be stationed for the purpose of collecting data necessary for the conservation, management, and understanding of any fisheries under the Council's jurisdiction except salmon. The Research Plan will establish a system of fees to pay the implementation costs. The Research Plan is designed to: (1) gather reliable data for the conservation, management, and scientific understanding of the Research Plan fisheries; (2) be fair and equitable to all vessels and processors; (3) be consistent with applicable provisions of law; and (4) consider the operating requirements of the fisheries and the safety of observers and fishermen. The system of fees shall: (1) limit the total fees to implementation costs minus any amounts authorized under other provisions of law and any surplus in the North Pacific Fishery Observer Fund; (2) be fair and equitable to all participants in the fisheries; (3) provide that fees collected not be used to pay any costs of administrative overhead or other costs not directly incurred in carrying out the Research Plan; (4) not be used to offset amounts authorized under other provisions of law; (5) be expressed as a percentage not to exceed two percent of the exvessel value of the Research Plan fisheries; (6) be assessed against all fishing vessels and fish processors including those not required to have observers; and (7) provide that the fees only be used for implementing the Research Plan.

After the Secretary has reviewed the feasibility of establishing a risk sharing pool to provide insurance coverage for vessels and owners against liability from civil suits by observers, the Research Plan will be modified to include a risk sharing pool if that review demonstrates that such a pool is necessary.

3.3 Changes Approved by the Council in December 1993

At its December 1993 meeting, the Council approved several changes for the Research Plan before submission to the Secretary. Those changes are included in the description and analysis of Alternative 2 presented in this document. A brief analysis of the changes is presented below.

The Council had recommended requiring guarantees equal to the maximum estimated quarterly fee assessment for the upcoming calendar year to secure anticipated fee liabilities, in the form of prepayments, letter of credit, surety bond, or lien on property. However, in December the Council agreed that the requirement of such guarantees is premature and could be burdensome to the industry, particularly to smaller enterprises, and costly to administer. Small or marginally profitable enterprises could have difficulty in securing such guarantees and there are irrecoverable costs to the industry associated with guarantees such as letters of credit and surety bonds. Furthermore, collection on some guarantees could be difficult to accomplish in a timely and cost-effective manner; therefore, they could be of limited value in ensuring necessary cash flows and achieving the objectives of the Research Plan. The Council voted to replace the requirement for such guarantees with a simplified system to strongly encourage timely fee assessment payments by processors. That system consists of: (1) bimonthly billing; (2) semi-annual processor permitting with a requirement that all Research Plan fee assessments must be current before a permit application will be considered complete and a permit will be issued; (3) a prohibition against processing landings from Research Plan fisheries without a valid processing permit; and (4) a prohibition against delivery of landings from Research Plan fisheries to a processor not possessing a valid processing permit. This system also has the advantage of simplified reporting and recordkeeping requirements for processors and reduced administrative costs for NMFS. The extent of nonpayment of fee assessments, which is inherent in any fee collection system, would be taken into account in determining the fee percentage rate for the following year; the proposed system is designed to minimize such nonpayment. If experience demonstrates that nonpayment is a significant problem, the Research Plan could be modified to implement other measures, including guarantee requirements.

The other change was the Council had initially recommended that the fee collection system under the proposed Research Plan would be in effect for only 3 years, after which it would terminate, unless extended through rulemaking. At the time it made this recommendation, the Magnuson Act limited the fees to 1% of the value of the Research Plan fisheries. The Council had determined that 1% of the exvessel value of these fisheries would not be enough to fund the current level of observer coverage and it decided to impose a fee of not more than 1% of the wholesale value or 2% of the exvessel value. Subsequent to that recommendation, the Magnuson Act was amended to increase the fee limit to 2% of exvessel value. This revised limit and the annual review that would be required under the Research Plan decreased the concern that there would not be sufficient fiscal responsibility in setting the observer coverage requirements and the annual fee percentage. This, combined with the brief time that the Research Plan would have been in effect when it would have been necessary to evaluate its extension, decreased the expected net benefits of a specific expiration data.

3.4 Modifications Since the December 1993 Council Meeting

Two modifications have been made to improve administrative efficiency and equity during the first year of the Research Plan. Both are consistent with the Elements of the North Pacific Fisheries Research Plan that were adopted by the Council June 28, 1992, both are included in the description and analysis of Alternative 2 presented in this document, and both are applicable only during the first year of the Research Plan. In subsequent years, the contractors will be solely paid by NMFS using funds generated by the fee assessments.

The modifications are as follows: (1) refunds for direct payments for required observer coverage will be in the form of rebates to vessels and processors, rather than in the form of fee payment credits and (2) the refunds will be based on actual direct payments for observer coverage up to a predetermined amount per observer day; in some instances the refund to a vessel or processor will exceed its fee payment.

These modifications will simplify the administration of the refunds because it eliminates the necessity of keeping track of the catch of each individual vessel. The modifications improve the equity of the program by assuring that through a combination of direct payments to observer contractors, fee payments to NMFS, and refunds from NMFS, the cost for each vessel and processor will be approximately equal to what it would pay if it were only subject to the fee percentage that will be established for the first year of the Research Plan. If less complete refunds were permitted, the cost would be substantially higher for some vessels and processors. Specifically, it would be higher for operations with lower catch or production per day of required observer coverage. These tend to be the smaller operations with observer coverage requirements. This refund program will require a higher fee percentage to generate a given amount of start-up funds for the second year of the Research Plan.

4.0 CONSISTENCY WITH OTHER APPLICABLE LAW

4.1 Effects on Endangered Species and Marine Mammals

Fishing activities conducted under the any of the considered alternatives would not affect marine mammals or birds or any endangered or threatened species listed under the Endangered Species Act in any manner not already considered in previous formal and informal consultations on the Gulf of Alaska and Bering Sea and Aleutians management area groundfish fisheries or the Bering Sea and Aleutian Islands area commercial king and Tanner crab fisheries. As a result, none of the alternatives would constitute actions that would adversely affect endangered or threatened species or their habitat as outlined in regulations implementing Section 7 of the Endangered Species Act of 1973 and consultation procedures under Section 7 on the final actions and their alternatives will not be necessary.

4.2 Coastal Zone Management Act

Each of the alternatives would be conducted in a manner consistent, to the maximum extent practicable, with the Alaska Coastal Management Program within the meaning of Section 307(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

4.3 Executive Order 12866

E.O. 12866, "Regulatory Planning and Review", enacted September 30, 1993, established guidelines for promulgating new regulations and reviewing existing regulations. While the executive order covers a variety of regulatory policy considerations, the benefits and costs of regulatory actions are a prominent concern. Section 1 of the order deals with the regulatory philosophy and principles that are to guide agency development of regulations. The regulatory philosophy stresses that, in deciding whether and how to regulate, agencies should assess all costs and benefits of all regulatory alternatives. In choosing among regulatory approaches, the philosophy is to choose those approaches that maximize net benefits to society.

The regulatory principles in E.O. 12866 emphasize careful identification of the problem to be addressed. The agency is to identify and assess alternatives to direct regulation, including economic incentives, such as user fees or marketable permits, to encourage the desired behavior. When an agency determines that a regulation is the best available method of achieving the regulatory objective, it shall design its regulations in the most cost-effective manner to achieve the regulatory objective. Each agency shall assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Each agency shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of, the intended regulation.

NOAA requires the preparation of an RIR for all regulatory actions which either implement a new FMP or significantly amend an existing plan. The RIR is part of the process of preparing and reviewing FMPs and provides a comprehensive review of the changes in net economic benefits to society associated with proposed regulatory actions. The analysis also provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems. The purpose of the analysis is to ensure that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR addresses many of the items in the regulatory philosophy and principles of E.O. 12866.

E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant". A "significant regulatory action" is one that is likely to result in a rule that may:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

A regulatory program is "economically significant" if it is likely to result in the effects described in item 1 above. The RIR is designed to provide information to determine whether the proposed regulation is likely to be "economically significant".

The user fee program will have an annual effect of substantially less than $100 million, since it will not collect funds in excess of 2% of the exvessel value of the plan fisheries (valued at less than $1 billion), since most of the fees collected will reflect a redistribution of costs as opposed to an increase in costs for the industry as a whole, and since the total value of the catch of the plan fisheries is not expected to change as a result of the collection of user fees.

Regulations do commonly impose costs and cause redistribution of costs and benefits. If the proposed regulations are implemented to the extent anticipated, these costs are not expected to be economically significant. The user fee program will not have significant adverse effects on the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities. While payment of user fees will increase costs for some fishing and processing operations, it will decrease costs for others. The total fees that can be collected cannot exceed 2% of the exvessel value of the plan fisheries. Therefore, for the plan fisheries as a whole, the fees will be substantially less than 2% of the first wholesale value of the covered seafood products

The proposed program should not interfere with actions taken or planned by other agencies, nor should it materially alter the budgetary impact of entitlements, grants or loan programs. The user fees collected under this program will reflect the budgetary impact intended by Congress to specifically fund the observer program from industry contributions. There are no novel legal or policy issues raised by this proposed program.

The proposed regulation establishing a user fee program to fund the North Pacific Fisheries Research Plan does not appear to be a "significant" or "economically significant regulatory action" under the criteria established in E.O. 12866.

4.4 Regulatory Flexibility Act

The Regulatory Flexibility Act requires that impacts of regulatory measures imposed on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions with limited resources) be examined to determine whether a substantial number of small entities will be significantly impacted by the proposed measures. Although the proposed regulations will have an economic impact on a large number of small entities, the impacts will not be significant.

4.5 Title 9701 (B)

Title 9701 (B) of the U.S. Code Annotated, Chapter 31, requires an assessment of the value of services received compared to the charges of those services. Specifically, the section states that each such charge shall be:

1. fair, and
2. based on:
   (A) the costs to the government
   (B) the value of the service to the recipient
   (C) public policy or interest served
   (D) other relevant facts

The proposed Research Plan would result in a method of funding for the observer program that has been determined to be more fair than the current system whereby some participants in the fishery pay directly for their required observer coverage. The value of the service, in this case observer coverage, is directly related to the public policy or interest served. It has been determined by the Council, with the overwhelming support of the fishing industry, that an observer program is vitally necessary to provide the information crucial to fisheries management. The information gained through the observer program is necessary for monitoring the directed catch of fish off Alaska, bycatch of prohibited species, interactions with marine mammals, and overall conservation of the resources under the jurisdiction of the Council.

4.6 Finding of No Significant Impacts

For the reasons discussed above, neither implementation of the status quo nor any of the alternatives would significantly affect the quality of the human environment, and the preparation of an environmental impact statement on the final action is not required by Section 102(2)(c) of the National Environmental Policy Act or its implementing regulations.

Assistant Administrator for Fisheries

Date

5.0 COORDINATION WITH OTHERS

The preparers consulted extensively with representatives of the North Pacific Fishery Management Council and its Data Committee, National Marine Fisheries Service, NOAA Comptroller's Office, Pacific Marine States Fisheries Commission, Alaska Department of Fish and Game, and members of the fishing industry.

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